AXEL Platine Terminal

AX3000 Models 80 and 85

USER'S MANUAL

December 2013 - Ref.: AX3E/1236-USB-DRAFT-0c

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INTRODUCTION

This manual provides details on terminal operation, maintenance and set-up.

The manual is organized into the following chapters and appendices:

Chapter 1: Introduction to the AX3000
Introduction to the AX3000's main features.

Chapter 2: First Boot Time
When the terminal is powered-up for the first time, the Quick Set-Up provides a fast and easy method to configure the AX3000. In addition the Auto-Configuration service is started.

Chapter 3: Interactive set-up
The interactive set-up allows network, application desktop and sessions to be configured. It allows also peripherals to be configured

Chapter 4: Using the AX3000
How to use the local desktop and the multi-session feature.

Chapter 5: Installing under Windows
Description of application desktop (RemoteApp/Citrix) and sessions (TSE/RDS, Citrix and VMware View Client).

Chapter 6: Installing under OS/400
Description of 5250 specific features.

Chapter 7: Installing under OS/390
Description of 3270 specific features.

Chapter 8: Installing under Unix/Linux

Description of Unix/Linux specific features (tty server, multi-shell, VNC server...).

Chapter 9: Tools and Statistics

Description of the embedded AX3000 tools (ping, statistics, etc).

Chapter 10: Remote Administration

Introduction of AxRM (Axel Remote Management software on Windows)
Description of configuring terminals remotely via 'telnet'
Description of remotely sending a configuration text file to one or multiple terminals.

Appendices:

The following appendices give more detailed information:

- A.1 - Using the AX3000 interactive set-up
- A.2 - Network overview (Ethernet address, IP address and routers)
- A.3 - DHCP protocol
- A.4 - DNS protocol
- A.5 - Axel DHCP Option
- A.6 - Dual Monitor
- A.7 - Administration command list (rsh)
- A.8 - Going further...
- A.9 - Hardware and firmware information

- 1 -
INTRODUCTION TO THE AX3000

This chapter introduces the main features of the AXEL TCP/IP terminal.

1.1 - ULTRA THIN CLIENT TECHNOLOGY

The main benefits of "Ultra Thin Client" technology are:

No Operating System

The innovative Ultra Thin Client technology from Axel uses ALL the hardware resources for specific thin-client functions and not simply to host an operating system. These functions are:

- Screen refresh/resolution performance
- High robustness and availability
- No memory fragmentation
- Totally virus proof
- Instant boot

No Embedded Applications

Embedded applications in a terminal are a source of problems, consider the following:

- Application of regular security upgrades and patches
- Support and tracking of successive versions of applications
- After an upgrade more memory may be required to run new version
- Integrity of functionality: ie two 'identical' terminals may behave very differently depending on installed applications and their versions.

No Local Management

By not having an operating system the set up is massively simplified.

- No file system or registry,

- No management of user accounts,
- New parameter settings are effective immediately (i.e. no need for reboot),
- No backup or restore file issues (in the event of reversing a failed software upgrade).

Despite its advanced technology the Axel terminal is managed like a traditional terminal. The set-up is designed to be equally accessible from the terminal or remotely over the network (by telnet or VNC).

1.2 - MAIN FUNCTIONS

1.2.1 - Network Functions

The Axel terminal supports the following network functions:
- DHCP: obtaining an IP address and other parameters
- DNS: publishing the terminal name and resolving server names
- Routing: WAN connection

In addition for the AX3000 M85 there is a choice of the active interfaces, either Ethernet or Wireless. Only one interface can be active but each provides its own IP settings (DHCP, DNS, routers).

1.2.2 - Terminal Function

With its set of protocols and emulations, the terminal can be connected to most of multi-user environments.

A terminal can support up to **six concurrent and independent** sessions which can be used as**:**
- **Predefined sessions**: the session is defined (protocol / emulation / resolution) to be connected to any given server.
- **Application desktop**: after local authentication, icons of published applications are displayed. When an icon is selected, a dynamic session (RDP/ICA) is created.

A status bar or hotkey are used to open or switch between sessions.

For secured connections, SSL (with certificates) and the RDP/ICA gateway feature is supported.

1.2.3 - Print and Terminal Server

The AX3000 auxiliary ports can be managed either:

- By a network service: LPD or PRT5250 for printers, TELNET CLIENT for serial terminals or TTY for other peripherals.
- By escape sequences: compatible with serial terminals. (Slave mode)

1.2.4 - Handling other Devices

Other devices are supported:

- Barcode readers,
- touch screens,
- USB drives,
- Smartcard readers,
- Audio (input/output).

1.2.5 - Administration

The Axel XML protocol allows terminals to be remotely administrated. The Axel administration software (AxRM) is free and can be downloaded from our web site.

Embedded AX3000 tools are provided, for example network “ping” and USB diagnostics.

1.3 - TERMINAL MODELS

The manual describes the configuration and the use of all Axel terminal models. The following table lists the main differences between models:

	Model 80WMS	Model 80	Model 85
Connection			
Ethernet (TCP/IP)	10/100 BT	10/100 BT	10/100 BT
Wireless (802.11)	---	---	option
Serial (RS232)	---	By USB	yes
Sessions			
Microsoft TSE - TSE (from NT4 to 2008R2) - RemoteApp - Multipoint	 --- --- yes	 yes yes yes	 yes yes yes
Citrix - XenApp & Metaframe - XenDesktop	 --- ---	 yes yes	 yes yes
VMware Client	---	yes	yes
VNC Client	---	yes	yes
Text Emulations	---	yes	yes
Connectors			
Parallel Port	By USB	By USB	1
Serial port	---	By USB	2
USB Port (2.0)	4	4	2 (M85) 4 (M85B)
Other			
USB Drive	yes	yes	yes
Smartcard	---	yes	yes
Audio	By USB	By USB	By USB
VNC Server	yes	yes	yes

Note: a separate user's manual is dedicated to the configuration and the use of AX3000 Model 80WMS.

- 2 -
INITIAL POWER-ON

This chapter describes the 'Quick Set-Up' feature and the 'Auto-Configuration' service.

When the terminal is switched on up for the very first time two configuration methods are available:

- **Quick Set-Up**: a wizard allows the terminal to be set-up in few seconds for typical use.
- **Auto-Configuration**: used in conjunction with AxRM, this function allows the terminal to automatically receive new firmware and/or a configuration.
  IMPORTANT: the auto-configuration must use the Ethernet interface, i.e. not applicable through Wireless interface.

2.1 - QUICK SET-UP

This feature is automatically run when the AX3000 is powered up for the first time or can be accessed at any time from the interactive set-up, by pressing Ctrl-Alt-Esc (**[Configuration]-[Quick set-up]**).

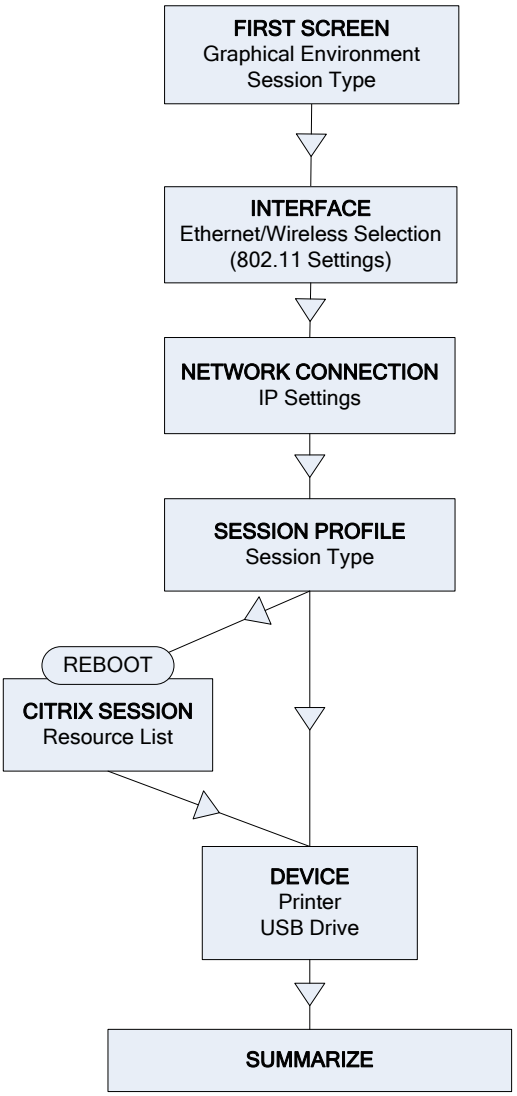
The quick set-up is designed for a typical simple environment of:

- One server
- An optional router
- All sessions set identically
- Remote Control
- Optional printer and memory stick

Note: After the 'Quick set-up' is run all other parameters within the terminal are reset to their factory default values.

The 'quick set-up' guides the user through a setup menus in an intuitive manner.

The dialog box structure (referred to as a Wizard) is shown below:



Note: the following keystrokes are available in the set-up (for more information see Appendix A.1):

- <Enter>: if the current field is a button perform a click. Else jump to the 'default' button of the box ([OK], [Next]…)
- <Spacebar>: click button, toggle yes/no and open a list
- <Esc>: cancel current field or select [Cancel] button
- <Tab> or <↓>: next field
- <Shift><Tab> or <↑>: previous field

2.1.1 - First Screen

This first screen allows the session type to be selected:

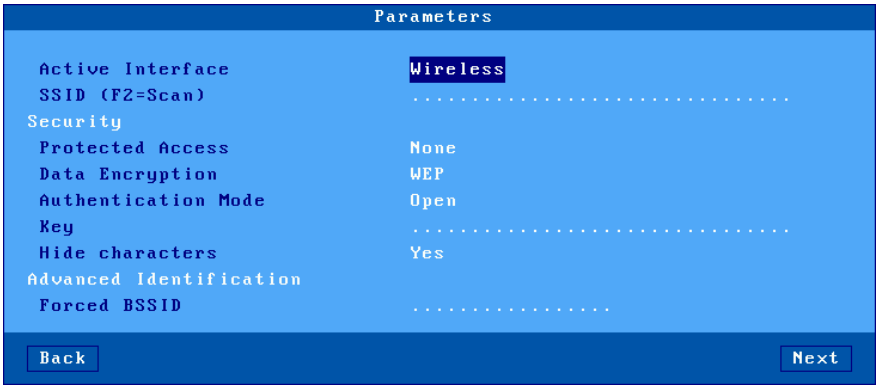
These parameters are:

- **Keyboard**: keyboard nationality. The value selected is used from there on.
- **Terminal Name**: See appendix A.4.3
- **Remote control Allowed**: allows terminal to be controlled over the network. (See Chapter 10.2)
- **Resolution**: the default value is monitor-dependent (auto-detection of the recommended resolution). The available resolutions vary depending on the terminal model. See Chapter 3.2.2.
- **Colors**: see Chapter 3.2.2.

Note: when exiting the dialog box the graphical settings (resolution and frequency) may be tested.

2.1.2 - Interface Selection

The Interface Selection box is shown below:

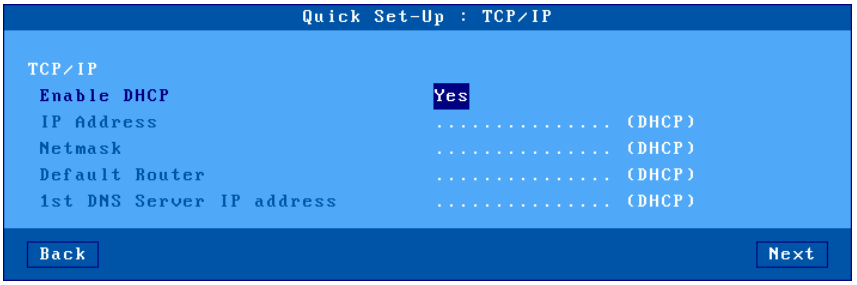


The parameters are:

- **Active Interface**: Two possible values:
  - **Ethernet**: The rest of the parameters are disabled
  - **Wireless**: Connection and security settings are requested.
- Other parameters: See Chapter 3.1.3 for more information.

2.1.3 - Network Connection

The Network dialog box is shown below:



The parameters are:

- **Enable DHCP**: two options:
  - **Yes**: the DHCP protocol is run when the set-up is exited and the terminal automatically obtains an IP address and various other DHCP options (netmask, default router, etc).
  - **No**: a Static IP address is required
- **IP address:** mandatory if DHCP is disabled.
- **Default router**: optional router IP address.
- **1st DNS Server IP Address**: optional DNS server IP address

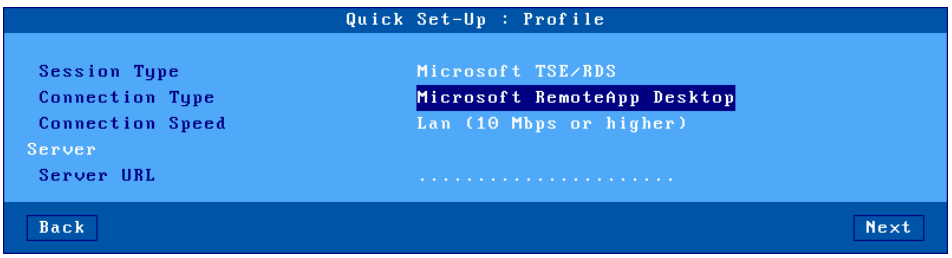
For more information about DHCP and DNS, please refer to appendices A.3 and A.4.

2.1.4 - Session Profile

This box allows the environment to be selected. This is done through the 'Session Type' and 'Connection Type' fields.

a) Microsoft TSE/RDS - RemoteApp Desktop

The RemoteApp desktop allows, after authentication, published application icons to be displayed on the terminal's local desktop. RDP sessions will be created dynamically:



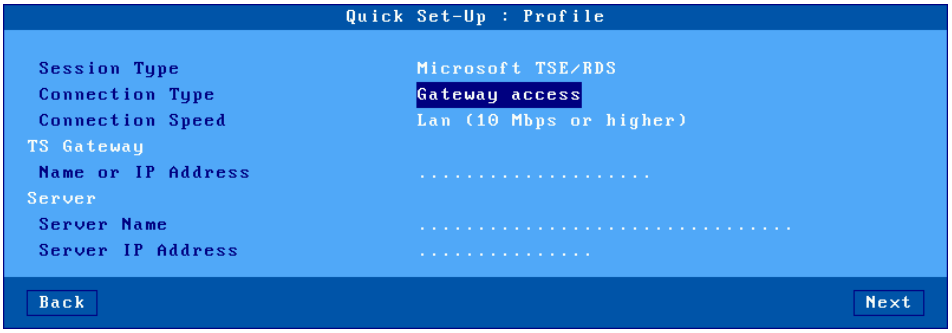
These parameters are:

- **Connection Speed**: network type selected trough a list.
- **Server URL**: syntax is [https://]server[:port][/config].
  - **https**: optional use (default: http)
  - **server**: DNS name of IP address of RemoteApp server
  - **port**: optional TCP port (default: 80 for http and 443 for https)

- **/config**: optional configuration full pathname (default is "/rdweb/feed/webfeed.aspx")

b) Microsoft TSE/RDS - Direct or Gateway Access

A predefined RDP session will be connected to a TSE/RDS server (identified by its name or IP address):

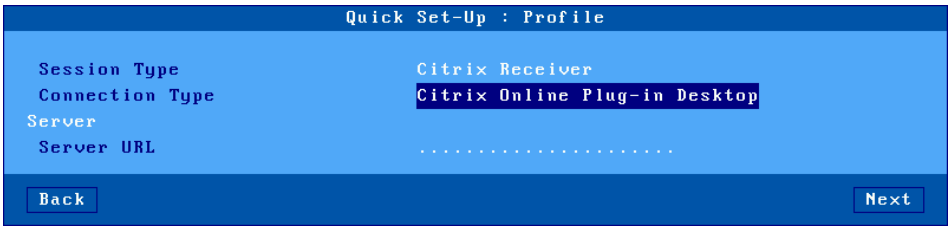


These parameters are:

- **Connection Speed**: network type selected trough a list.
- **Name or IP Address** (only for Gateway Access): DNS Name or IP address of secure gateway
- **Server Name**: TSE server DNS name
- **Server IP Address**: enter IP address or leave blank if using TSE Server DNS name in field above

c) Citrix Receiver - Citrix Receiver Desktop

The Citrix Receiver desktop allows, after authentication, published application icons to be displayed on the terminal's local desktop. ICA sessions will be created dynamically:

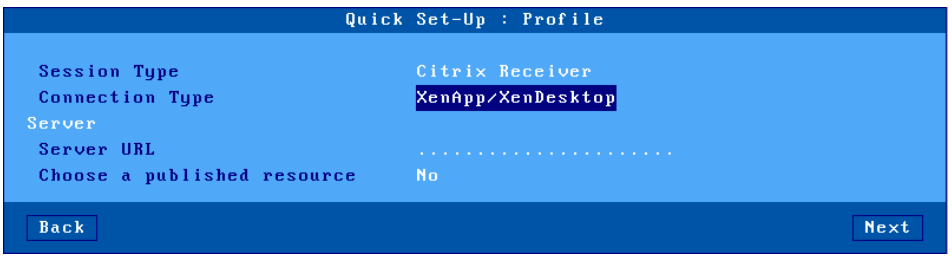


These parameters are:

- **Server URL**: syntax is [https://]server[:port][/config].
  - **https**: optional use (default: http)
  - **server**: DNS name of IP address of WEB Interface server
  - **port**: optional TCP port (default: 80 for http and 443 for https)
  - **/config**: optional configuration full pathname (if not specified the default "/Citrix/PNAgent/config.xml" is auto-appended

d) Citrix Receiver - XenApp/XenDesktop

A predefined ICA session associated with a resource published by the "WEB Interface PNagent" protocol:



These parameters are:

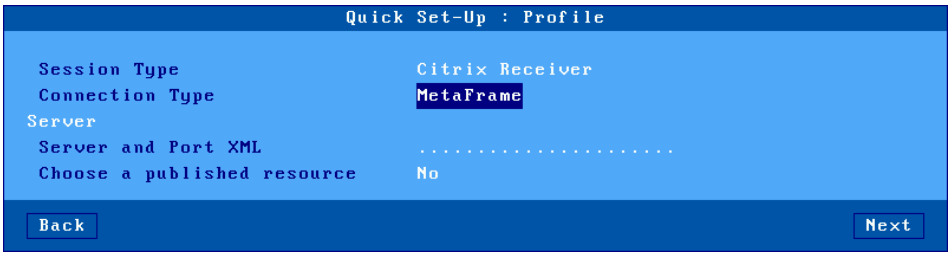
- **Server URL**: syntax is [https://]server[:port][/config].
  - **https**: optional use (default: http)

- **server**: DNS name of IP address of WEB Interface server
- **port**: optional TCP port (default: 80 for http and 443 for https)
- **/config**: optional configuration full pathname (default is "/Citrix/PNAgent/config.xml")

- **Choose a Published Resource**: if 'no', a resource list will be proposed to the user. If 'yes', the predefined resource can be chosen with the next quick set-up box. (But the terminal has first to be rebooted). See Chapter 2.1.5.

e) Citrix Receiver - MetaFrame

A predefined ICA session associated with a resource published by the "TCP/IP + HTTP" protocol:

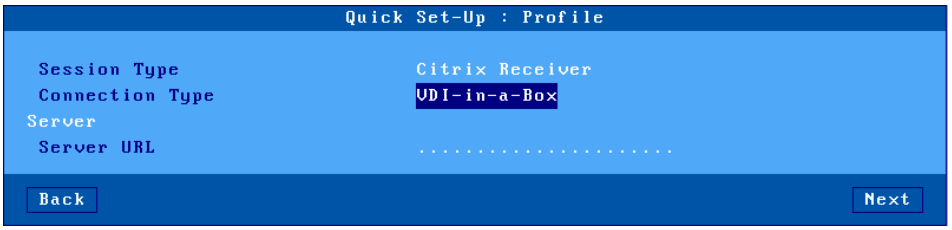


These parameters are:

- **Server and XML Port**: DNS name or IP address optionally followed by the XML port (use ':' as separator)
  Example: 192.168.1.154:8080
- **Choose a Published Resource**: if 'no', the resource list will be proposed to the user. If 'yes', the predefined resource can be chosen with the next quick set-up box. (But the terminal has first to be rebooted). See Chapter 2.1.5.

f) Citrix Receiver - VDI-in-a-Box

With VDI-in-a-Box, after authentication, published desktop icons are displayed on the terminal local desktop. ICA sessions will be created dynamically:



These parameters are:

- **Server URL**: syntax is [https://]server[:port][/config].
  - **https**: optional use (default: http)
  - **server**: DNS name of IP address of WEB Interface server
  - **port**: optional TCP port (default: 80 for http and 443 for https)
  - **/config**: optional configuration full pathname (default is "/dt/PNAgent/config.xml")

g) Citrix Receiver - Direct Access

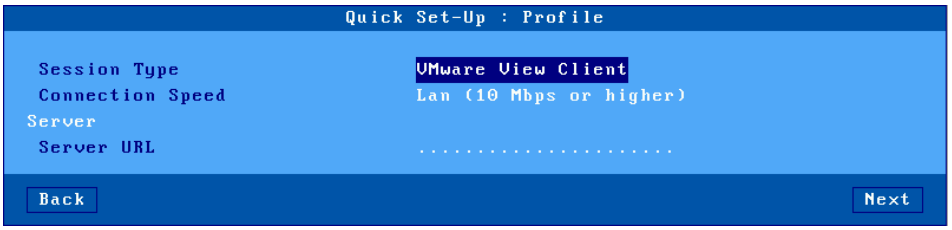
A predefined ICA session will be connected to a Citrix server (identified by its name or IP address):

These parameters are:

- **Server Name**: DNS name or simple mnemonic.
- **Server IP Address**: leave blank when using a DNS name

h) VMware View Client

VMware View Client, , publishes a list of desktops in a predefined session. An RDP connection is established after a desktop is selected:

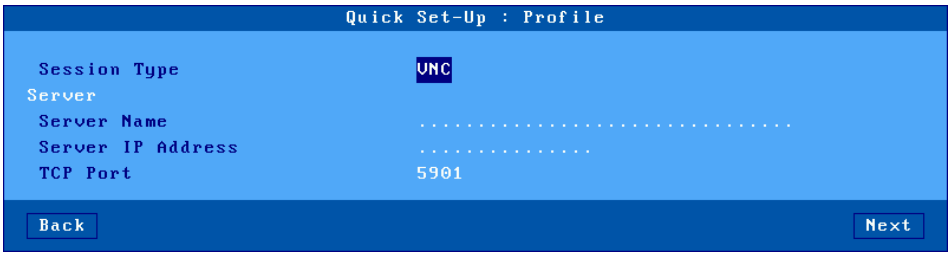


These parameters are:

- **Connection Speed**: network type selected through a list.
- **Server URL**: syntax is [https://]server[:port]
  - **https**: optional use (default: http)
  - **server**: DNS name of IP address of VIEW server
  - **port**: optional TCP port (default: 80 for http and 443 for https)

i) VNC

A predefined VNC session will be connected to a Linux server (identified by its name or IP address):

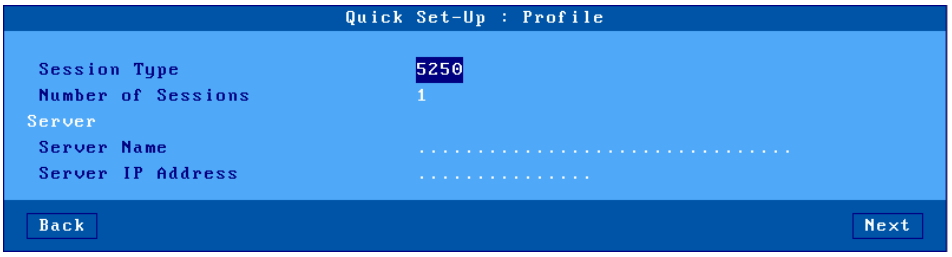


These parameters are:

- **Server Name**: DNS name or simple mnemonic.
- **Server IP Address**: leave blank when using a DNS name
- **TCP Port**: 5901 by default

j) 5250 or 3270

A predefined 5250 (or 3270) session will be connected to an iSeries (or zSeries) server (identified by its name or IP address):

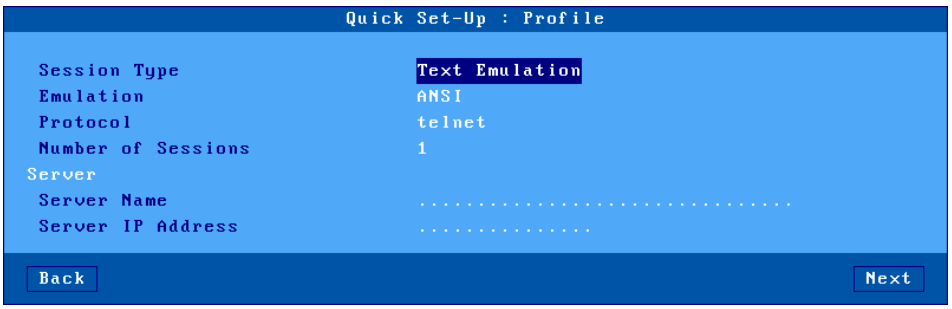


These parameters are:

- **Number of Sessions**: from 1 to 6 identical sessions can be created
- **Server Name**: DNS name or simple mnemonic.
- **Server IP Address**: leave blank when using a DNS name
- **TCP Port**: 5901 by default

k) Text Emulation

A predefined telnet or ssh session will be connected to a Unix/Linux server (identified by its name or IP address):



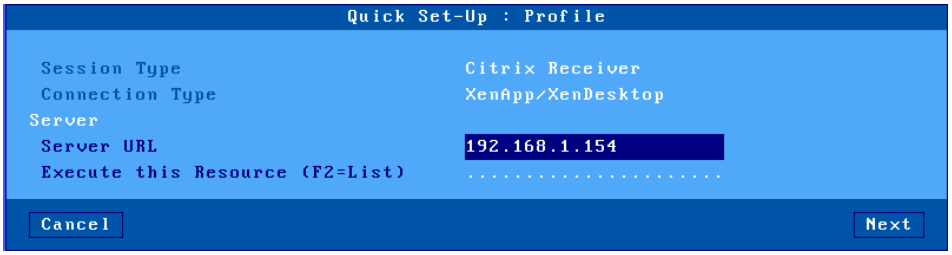
These parameters are:

- **Emulation**: selected from a list. See Chapter 8.1.3
- **Protocol**: telnet or ssh2
- **Number of Sessions**: from 1 to 6 identical sessions can be created

- **Server Name**: DNS name or simple mnemonic.
- **Server IP Address**: leave blank when using a DNS name

2.1.5 - Citrix Receiver - Resource Selection

With the 'Citrix Receiver' connection type, a resource can be predefined (see previous chapter). In this case, such a dialog box is displayed:

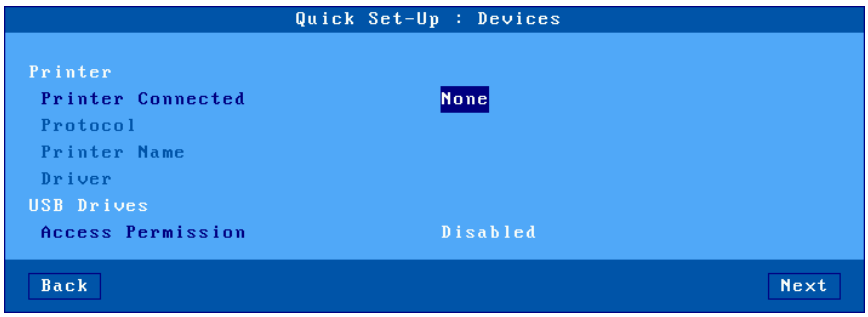


These parameters are:

- **Server URL**: the value entered from the previous dialog box may be changed.
- **Execute this resource**: the resource name can be either manually entered or picked from a list (an authentication may be needed). If this field is left blank, the resource list will be displayed at the connection time.

2.1.6 - Devices

This box is displayed for the all session types:

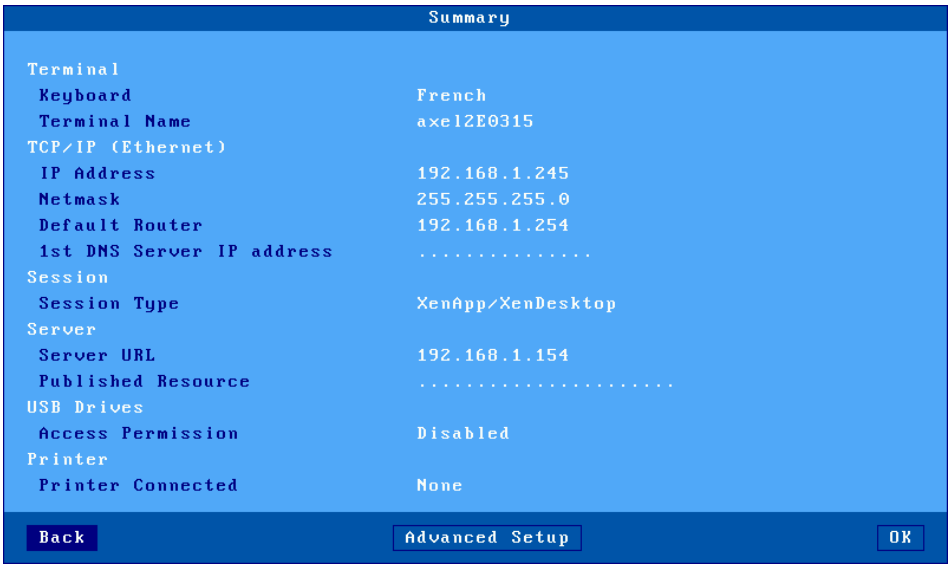


These parameters are:

- **Printer Connected**: auxiliary port where printer is attached (none, aux1, aux2, parallel, USB1).
- **Protocol**: LPD, TSE, Prt5250 or Prt3270. The next parameters are protocol-dependent:
  - LPD: **Queue Name** (name given to the auxiliary port)
  - TSE: **Printer Name** and **Windows TSE Driver**
  - Prt5250: **Printer Name** and **Driver** (printer type and model)
  - Prt3270: **Printer Name**
- **Access Permission**: only for Microsoft TSE/RDS and Citrix Receiver sessions where USB Mass Storage is supported.

2.1.7 - Set-Up Summary

At the end of the wizard process, a summary of the selected settings is displayed. For example:



Press the [OK] button to accept and use these settings. After an automatic reboot the terminal is ready to be used.

The [Advanced Setup] button enters the interactive setup where further configuring is possible. For example adding different session types.

2.2 - AUTO-CONFIGURATION

The Auto-Configuration feature allows a brand new ‘out of the box’ terminal to be sent a specific firmware and/or configuration file without any human intervention. There are also options to specify various terminal specific parameters, for example an IP address and terminal name etc.

For more information on AxRM’s activity in the auto-configuration process, see the manual "Axel Remote Management - Version 3", available from www.axel.com.

The auto-configuration process:

- Is automatically initiated when power is applied to a brand new terminal or if the terminal is reset to factory defaults - see A.10.1 appendix.
- may be started at each boot time. For more information see Chapter 3.6.2.

The stages are:

- Checking the network (link),
- DHCP request sent to obtain an IP address and other parameters (optional),
- Terminal contacts the AxRM server,
- Firmware file sent (if required), followed by a reboot,
- Configuration file sent, followed by a reboot.

Total process takes less than two minutes

2.2.1 - Stage 1: Checking the Network

When the terminal is powered up the network connection is tested. The terminal displays ‘Checking Network Link’. If a network connection is detected, a message ' Auto-Conf' is shown. The terminal passes to stage 2.

```
Auto-conf.
```

2.2.2 - Stage 2: Sending DHCP requests

To obtain an IP address (and possibly of other parameters) a DHCP request is sent. If a DHCP server is available its IP address is shown in the status line:

```
Auto-conf. / DHCP: aaa.bbb.ccc.ddd /
```

The terminal passes to stage 3

2.2.3 - Stage 3: Sending requests to AxRM

After obtaining an IP address via DHCP negotiation the terminal must start communicating with the AxRM server.

This presents a challenge because the terminal must determine both the IP address and the TCP port of the AxRM server.

The recommended way is to configure the DHCP server to send this information in addition to the AX3000 IP address. This information (IP address and port) can easily be entered into the DHCP server by using the vendor ID fields. "Axel DHCP option".

For more information about "Axel DHCP option" please consult the Appendix A.5.

a) Determining the TCP port

If DHCP sends a port number this is used.

If no value is received a default value of port 80 is used.

b) Determining IP address

Method 1:

If the IP address or DNS name is given by the DHCP server (through Axel DHCP option) then this is the information the terminal uses to locate the AxRM server.

Method 2:

If DHCP does not supply these values the terminal will try to resolve a ‘hardwired’ DNS name "axrmserv".

If the name is resolved the terminal can find the AxRM server. The name axrmserv must be configured within DNS to resolve to the IP address of the AxRM PC. A DNS alias can be used to allow the AxRM PC to have two names, i.e. its original name AND axrmserv.

Method 3:

If "axrmserv" cannot be resolved, as a final attempt the terminal assumes AxRM resides on the same PC as the DHCP server.

Method 4:

Only used when the location (IP address or name) and the TCP port of the AxRM machine are specified within the AX3000 Set-Up. See Chapter 3.6.2. (This is not viable for setting up brand new terminals, as required AxRM PC data to be already entered in the terminal setup)

The IP address of the AxRM server and the location method used is shown on the status line:

```
Auto-Conf. / DHCP: aaa.bbb.ccc.ddd / AxRM (1): www.xxx.yyy.zzz:nnnn.......
```

The terminal sends an 'auto-configuration' request to AxRM every 5 seconds. If no response is received after 10 attempts the terminal starts the mechanism again, i.e. from stage 1.

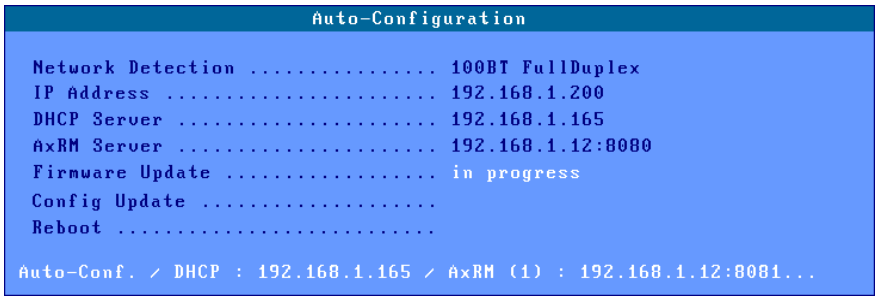
This loop stops when either AxRM responds or if a user presses any key on the keyboard, causing the normal interactive quick setup to run.

2.2.4 - Stage 4: Receiving the firmware download

A dialog box on the terminal screen provides the status. From this stage the mechanism cannot be aborted.

Note that firmware downloading may not have been specified by AxRM, in which case the procedure passes directly to stage 5.

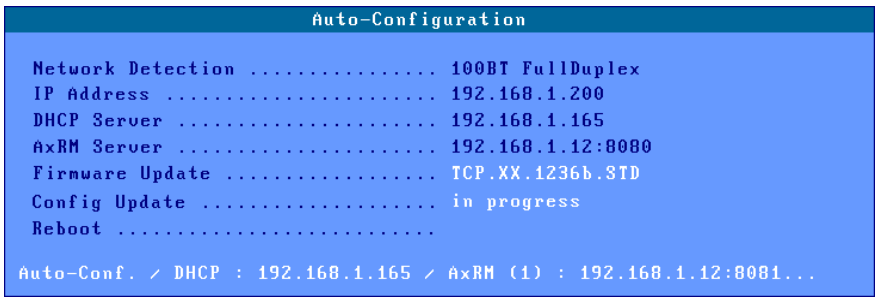
The dialog box is as shown:


Auto-Configuration
Network Detection ..... 100BT FullDuplex
IP Address 192.168.1.200
DHCP Server 192.168.1.165
AxRM Server 192.168.1.12:8080
Firmware Update ..... in progress
Config Update .....
Reboot .....
Auto-Conf. / DHCP : 192.168.1.165 / AxRM (1) : 192.168.1.12:8081...

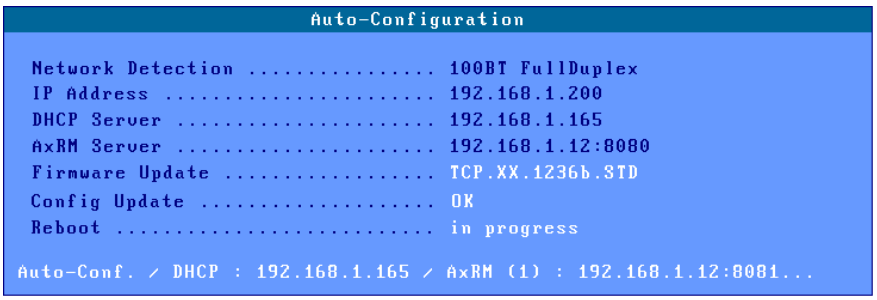
After having received the firmware the terminal reboots automatically and re-runs stages 1, 2 and 3 before passing on to stage 5.

2.2.5 - Stage 5: Receiving the configuration file

This is the dialog box shown when receiving the configuration file:


Auto-Configuration
Network Detection ..... 100BT FullDuplex
IP Address 192.168.1.200
DHCP Server 192.168.1.165
AxRM Server 192.168.1.12:8080
Firmware Update TCP.XX.1236b.STD
Config Update ..... in progress
Reboot .....
Auto-Conf. / DHCP : 192.168.1.165 / AxRM (1) : 192.168.1.12:8081...

Note: if the firmware is updated the new version is displayed. After the configuration file is received the terminal reboots:


Auto-Configuration
Network Detection ..... 100BT FullDuplex
IP Address 192.168.1.200
DHCP Server 192.168.1.165
AxRM Server 192.168.1.12:8080
Firmware Update TCP.XX.1236b.STD
Config Update ..... OK
Reboot ..... in progress
Auto-Conf. / DHCP : 192.168.1.165 / AxRM (1) : 192.168.1.12:8081...

The terminal is now ready for use.

- 3 -
INTERACTIVE SET-UP

This chapter describes AX3000 installation using the interactive set-up procedure.

The following can be used to enter the AX3000 interactive set-up:

- Using <Ctrl><Alt><Esc> from the terminal
- Using Remote Control from AxRM. (See Chapters 10.1 and 10.2)
- Using Telnet from another terminal/PC. (See Chapter 10.3)

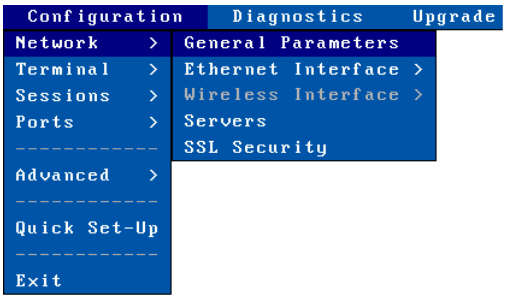
Note: the set-up can be password-protected, in which case the password must be entered to access the quick set-up dialog box. For more information, see Chapter 3.2.8.

Note: the following keystrokes are available in the set-up (for more information see Appendix A.1):

- <Enter>: if the current field is a button perform a click. Else jump to the 'default' button of the box ([OK], [Next]…)
- <Spacebar>: click button, toggle yes/no and open a list
- <Esc>: cancel current field or select [Cancel] button
- <F10>: select the 'default' button. Or, if this button is already selected, perform the associated action.
- <Tab> or <↓>: next field
- <Shift><Tab> or <↑>: previous field
- <Ctrl><C>: copy a character string or session settings
- <Ctrl><V>: paste information

3.1 - SETTING NETWORK ENVIRONMENT

The network settings are available through the **[Configuration]-[Network]** menu:



This chapter covers the AX3000 network configuration:

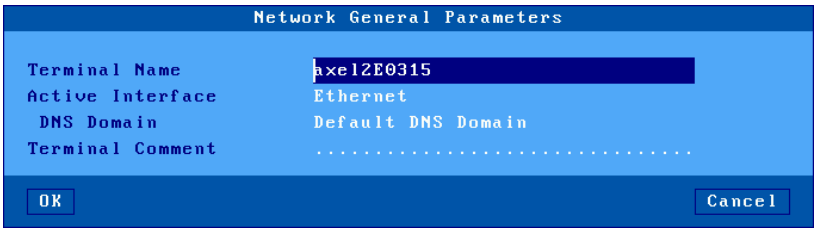
- **General Parameters**: the terminal identification and the interface activation
- **Ethernet Interface** or **Wireless Interface**: static or dynamic IP address, DNS protocol and router management
- **Servers**: manages the server list.
- **SSL Security**: tune the SSL certificate verification.

Note: more information is given in the following appendices:

- Appendix A.2: Ethernet addresses, IP addresses, net masks and routers,
- Appendix A.3: DHCP protocol,
- Appendix A.4: DNS protocol.

3.1.1 - General Parameters

To set the AX3000 interface and the terminal identification select the **[Configuration]-[Network]-[General Parameters]** menu. The dialog box below is displayed:



a) The Terminal Name

A terminal name is mandatory – though need not be used. By default the terminal name is set to 'axel' suffixed by the last part of the MAC Ethernet address. For example 'axel200002'. This ensures all terminals have a unique default name.

The same name is given to the default connection name for RDP or ICA connections, though this can be changed.

If the terminal name is to be used as a DNS name (i.e. registered to a DNS server) an extension is required. This extension is called "DNS domain". For example 'paris.axel.fr'.

Registering an entry with the DNS server requires an FQDN. (Fully Qualified Domain Name) If the "DNS Domain" parameter is empty, the "Default DNS Domain" (supplied by the DHCP server) will be used. If "Default DNS Domain" is empty, the name won't be registered.

The name registration can be performed by the DHCP server or by the terminal itself. For more information see the next chapter and the appendix A.4.3.

b) Active Interface

This parameter selects which interface to be used. Possible values are:

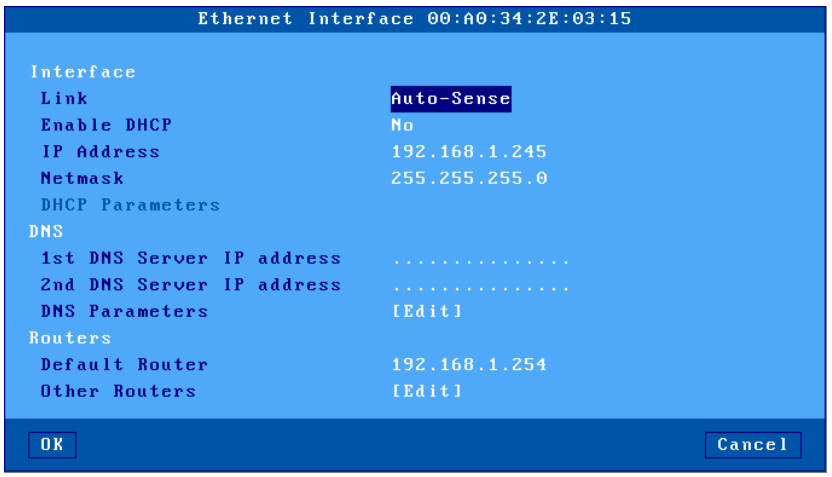
- **Ethernet**
- **Wireless**
- **None (serial mode)**

c) The Terminal Comment

This character string allows a terminal description to be entered. This description will be obtained by the Axel Remote Management software (AxRM) during the 'discover' operation. This comment will allow the terminal to be easily located within the database.

3.1.2 - Ethernet Interface

To set the Ethernet interface properties select the **[Configuration]-[Network]-[Ethernet Interface]-[IP Parameters]** menu. The dialog box below is displayed:



Note: the Ethernet address is displayed as the title box

The "**Link**" parameter is set by default as auto-sense. Available modes are:

- Auto-sense,
- 10BT HalfDuplex,
- 10BT FullDuplex,
- 100BT HalfDuplex,
- 100BT FullDuplex.

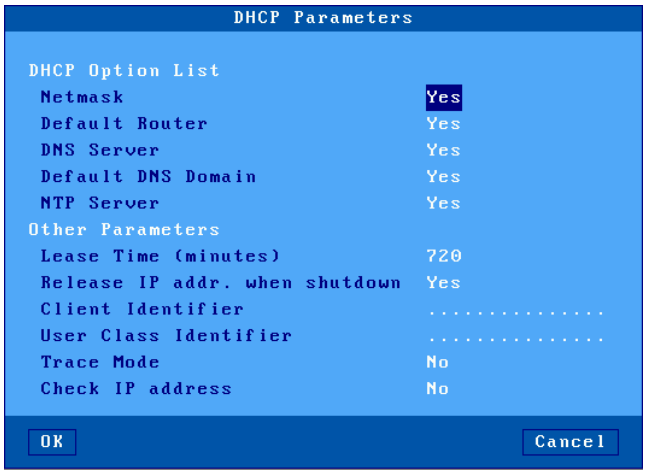
The next sub-chapters deal with:

- The interface setting (static or dynamic IP address)
- The DNS protocol.
- The router management,

a) Static or Dynamic IP Address

The DHCP protocol allows the terminal's IP address (and other parameters) to be obtained at the boot time.

When "**Enable DHCP**" is set to "**Yes**", the **IP Address'** field is not available and the DHCP settings are set through the "**DHCP Parameters**" option. Press <Space> to display the dialog box:



The "DHCP Option List" allows certain parameters to be automatically assigned by DHCP.

Other parameters are:

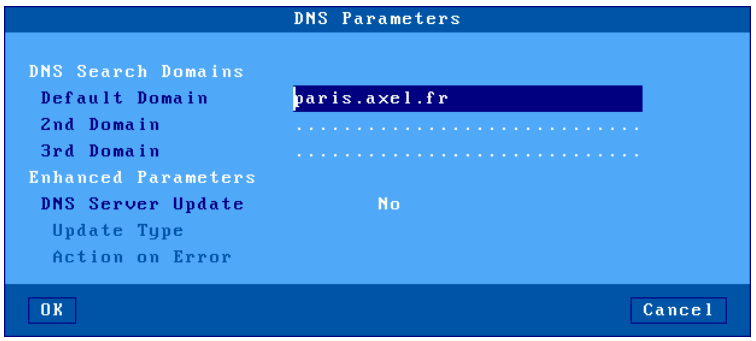
- **Lease Time (minutes)**: lease time value requested by the AX3000 from the DHCP server. Depending on the DHCP server settings this parameter may be ignored. The AX3000 automatically renews the lease when it expires.
- **Free IP address when shutdown**: by default when the terminal is shutdown a command to release the IP address is sent to the DHCP server.
- **Client Identifier**: allows the terminal to be identified not only by the Ethernet address (useful to control IP address assignment). - **User Class Identifier**: allows the DHCP server to assign settings in regards of a class of device.
- **Trace Mode**: in the event of problems this allows the data exchanged between the AX3000 and the DHCP server to be displayed on the screen. The trace data is displayed directly on the AX3000 screen (i.e. messages may 'pollute' the AX3000 display at any time).
- **Check IP Address**: the AX3000 checks its allocated IP address is not already in use.

b) DNS Protocol

To resolve a name, the AX3000 sends DNS requests to a DNS server. The IP address of this DNS server must be known. The AX3000 set-up procedure allows two DNS servers to be entered.

Note: if **'**DNS Servers' is selected the "DHCP Option List" these two parameters are supplied by DHCP and cannot be accessed here.

Other DNS settings are available through the "**DNS Parameters**" option. The dialog box below is displayed:



Parameters are:

- **DNS Search Domains**: a DNS domain is used to resolve a server name or to register the terminal name (see Appendix A.4).
  Note: if the 'Default DNS Domain' is selected in the "DHCP Option List", the 'Default Domain' parameter cannot be accessed.
- **DNS Server Update:** sets the method used for publishing the terminal name:
  - **No**: the terminal name is not published.
  - **By the DHCP server** (available only if the DHCP protocol is enabled): the terminal name is registered by the DHCP server. Requirement: the DDNS function (Dynamic DNS) must be supported by the DHCP server. See Appendix A.4.3.
  - **By the terminal**: the terminal updates the DNS server. In this case the parameter "Action on Error" controls the terminal's behavior in the event of an error during the DNS server update (see Appendix A.4.3).

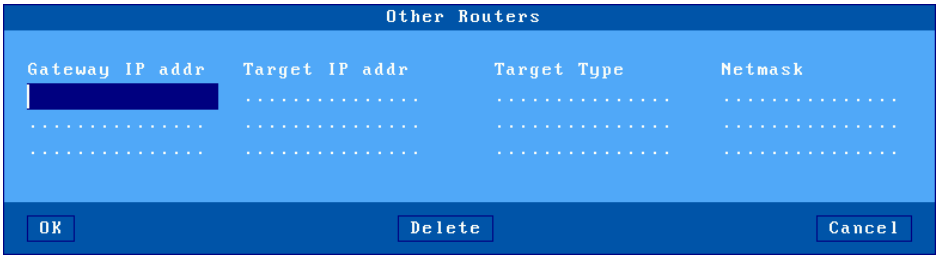
c) Router Management

A router is either a special electronic device, or a suitably configured computer, which enables data to be sent across two or more distinct physical networks.

One router can be nominated as the 'default router' and then used to access any network. Use of a default router simplifies site network administration. The default router is only identified by its IP address.

Note: If the 'Default Router' is selected in the "DHCP Option List", this field cannot be accessed.

However additional routers can also be declared, to reach specific destination servers or networks. Select 'Other Routers'. The following dialog box is displayed:



Any such router must be identified with 3 parameters:

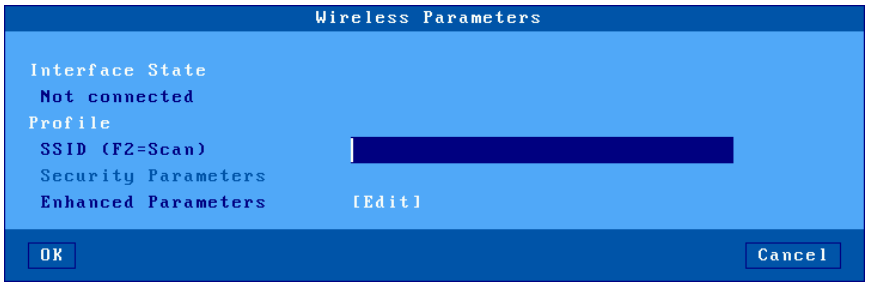
- The router's IP address,
- The target IP address (destination),
- The target type: server or network (in this last case, a netmask allows sub-netting)

3.1.3 - Wireless Interface

To set the Wireless interface properties select the **[Configuration]-[Network]-[Wireless Interface]** menu. The two sub-menus are:

- **[Wireless Parameters]**: see next page.
- **[IP Parameters]**: same dialog box as Ethernet interface (minus the 'Link' parameter)

The **[Wireless Parameters]** box is shown below:



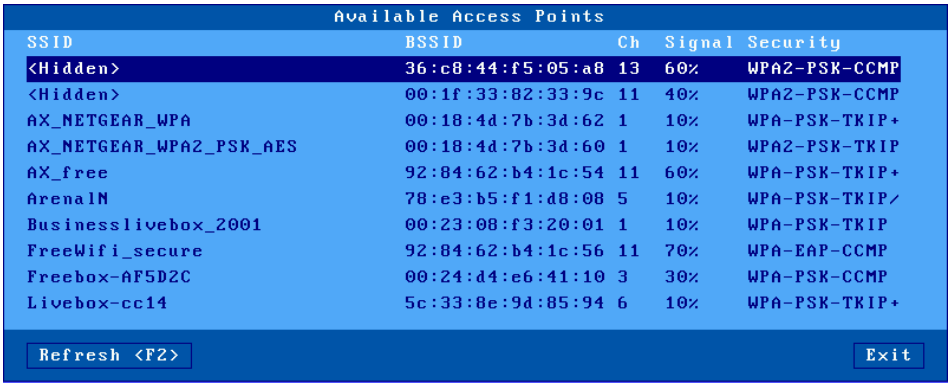
This box allows the wireless profile to be set-up (only one profile)

Note: when the wireless interface is connected a [Disconnected] button is available.

a) Selecting the SSID

The first step is to enter the access point SSID. This can be done manually or by a scan operation. (Available only if the wireless interface is not currently connected). The SSID is case sensitive.

The following shows a typical scan box (press <F2>):


Available Access Points
SSID BSSID Ch Signal Security
<Hidden> 36:c8:44:f5:05:a8 13 60% WPA2-PSK-CCMP
<Hidden> 00:1f:33:82:33:9c 11 40% WPA2-PSK-CCMP
AX_NETGEAR_WPA 00:18:4d:7b:3d:62 1 10% WPA-PSK-TKIP+
AX_NETGEAR_WPA2_PSK_AES 00:18:4d:7b:3d:60 1 10% WPA2-PSK-TKIP
AX_free 92:84:62:b4:1c:54 11 60% WPA-PSK-TKIP+
ArenaIN 78:e3:b5:f1:d8:08 5 10% WPA-PSK-TKIP/
Businesslivebox_2001 00:23:08:f3:20:01 1 10% WPA-PSK-TKIP
FreeWifi_secure 92:84:62:b4:1c:56 11 70% WPA-EAP-CCMP
Freebox-AF5D2C 00:24:d4:e6:41:10 3 30% WPA-PSK-CCMP
Livebox-cc14 5c:33:8e:9d:85:94 6 10% WPA-PSK-TKIP+
Refresh <F2>
Exit

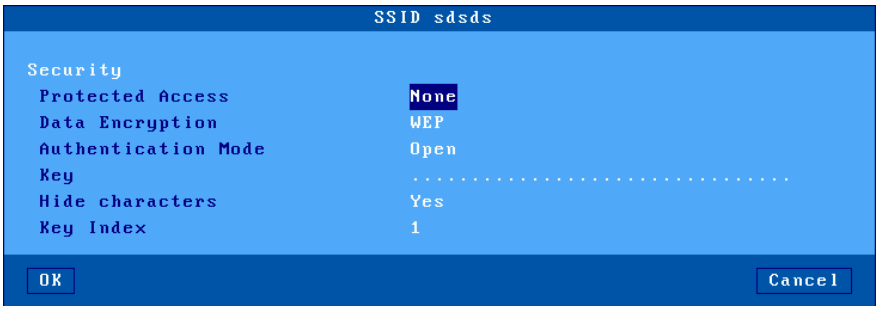
Note about hidden SSIDs: they are listed as <hidden>. If a hidden SSID is

selected the actual SSID name must be manually entered.

If the selected SSID is listed multiple times, a dialog box allows the connection to be forced or not to this SSID (Forced BSSID - see Sub-Chapter c).

b) Configuring the SSID

After the SSID selection, click "Security Parameters" to enter the SSID settings box:



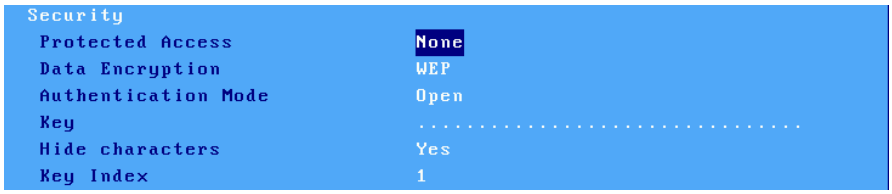
Note: if the SSID had been selected through a scan, SSID security parameters are automatically picked up.

The dialog box may differ depending of the 'Protected Access' setting. Possible values are:

- **None**: encrypted (WEP) or non-encrypted connection
- **Personal (PSK)**: encrypted connection (WPA/WPA2)
- **Enterprise (EAP)**: authenticated (LEAP/PEAP) and encrypted (WPA/WPA2) connection
- **802.1X**: authenticated (LEAP/PEAP) and encrypted (WEP) connection

The following describes each protected access type.

"**Protected Access**" is "**None**"

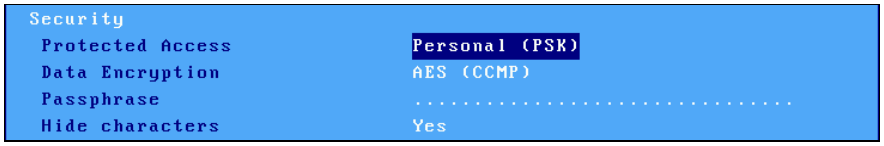


Data Encryption	Authentication Mode	WEP Key requested
WEP	Open	yes
	Shared	yes
None	---	---

Note 1: a WEP key is a character string. The key encoding is ASCII (length: 5 or 13 characters) or hexadecimal (length: 10 or 26 characters). For example the ASCII key value 12345 is 3132333435 in hexadecimal encoding.

Note 1: only one WEB key is managed. If needed use the "Key Index" option.

"**Protected Access**" is "**Personal (PSK)**"



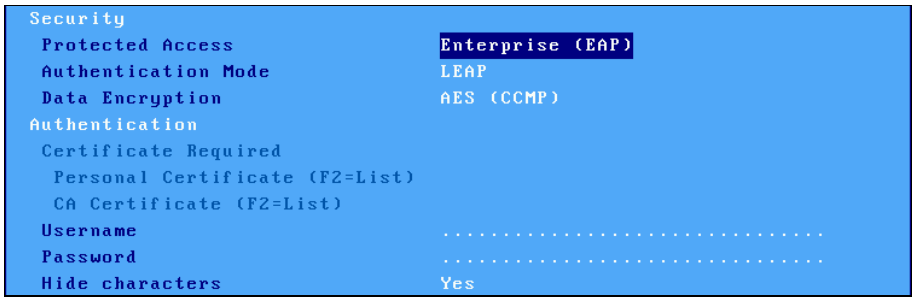
Data Encryption	Passphrase requested
AES (CCMP)	yes
TKIP	yes

Note 1: the "Personal (PSK)" protected access is known as WPA or WPA2. The Axel terminal is able to dynamically select one of these two protocols. If needed, a specific protocol (WPA or WPA2) can be forced via the "**Wireless PSK/EAP version**" in **[Configuration]-[Advanced]-[Tunings]**.

Note 2: The PreShare Key (PSK) is a 32 hexadecimal key which can be directly entered in hex or generated from an easy to remember passphrase. The passphrase length can be 8 to 63 characters and can be entered directly, for

example mysecretpasscode. If the key entered is 64 characters long the terminal assumes the key entered is the actual hex PSK key and no further conversion takes place. (32 bytes in hexadecimal code = 64 characters).

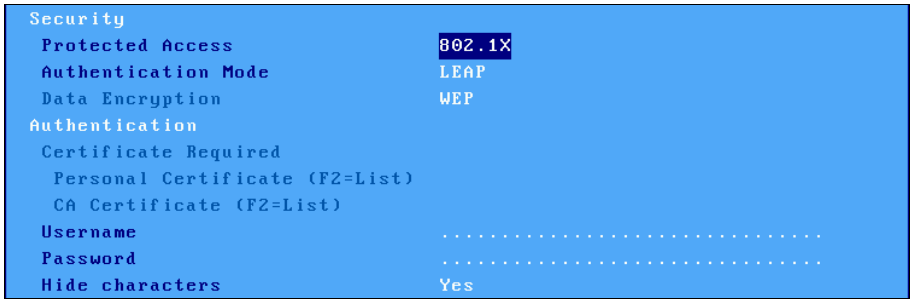
"**Protected Access**" is "**Enterprise (EAP)**"



Authentication Mode	Data Encryption	Password	Certificate
LEAP	AES (CCMP)	required	---
	TKIP	required	---
PEAP (MS-CHAP v2)	AES (CCMP)	required	optional
	TKIP	required	optional
EAP-TLS	AES (CCMP)	---	required
	TKIP	---	required

Note: see previous protected access mode for WPA / WPA2 protocols

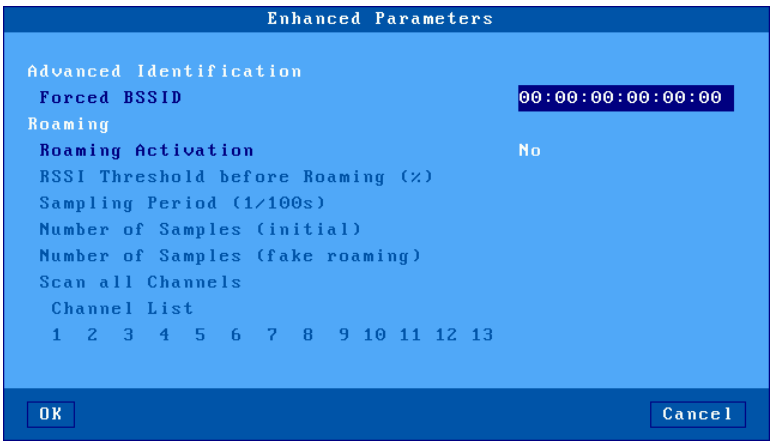
"**Protected Access**" is "**802.1X**"



Authentication Mode	Data Encryption	Password	Certificate
LEAP	WEP	required	---
PEAP (MS-CHAP v2)	WEP	required	optional
EAP-TLS	WEP	---	required

c) Advanced Settings

Within the "Wireless Parameters" dialog box, click "Enhanced Parameters":



Forced BSSID: in event of multiple access points with the same SSID, this option allows a specific one to be selected via its MAC address (BSSID).

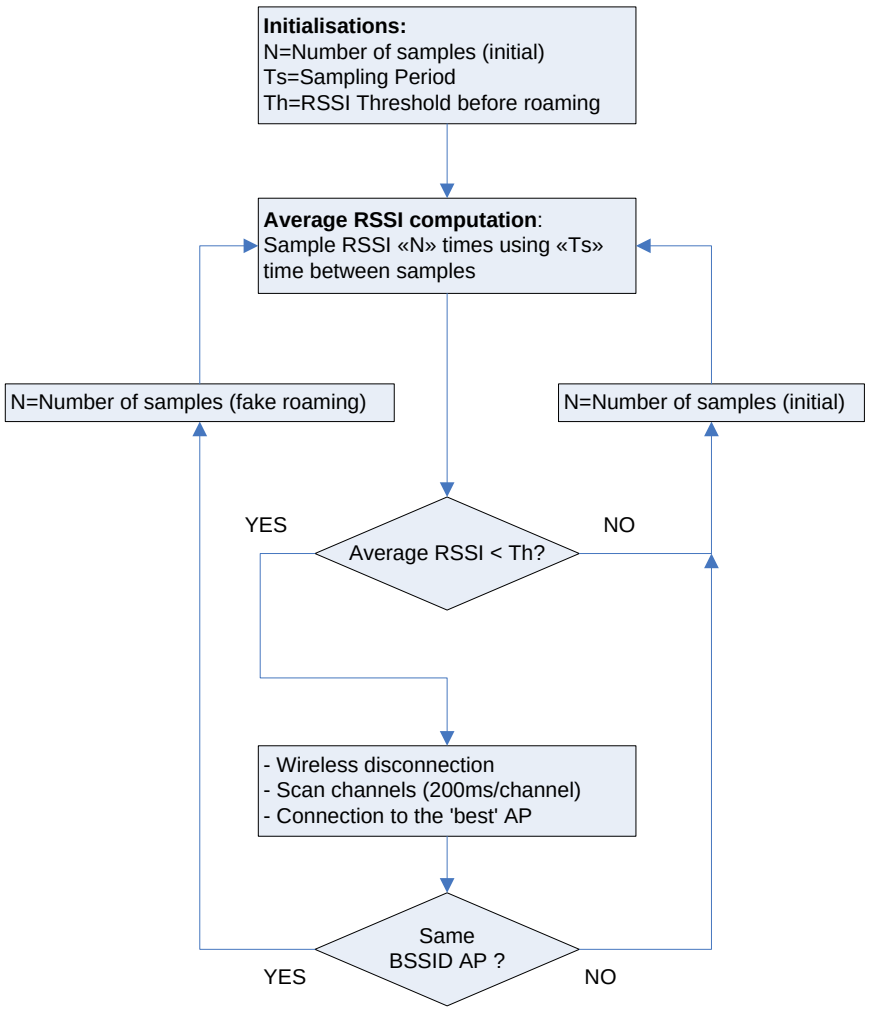
Roaming: this feature is only for 'mobile' terminals. When a terminal moves from its current access point (and the signal quality becomes too weak), the terminal automatically disconnects its wireless link and attempts to reconnect to the nearest access point (with the same SSID and same security settings). This should be 'invisible' for TCP connections (telnet, RDP, ICA...).The roaming options are:

- **RSSI Threshold before Roaming**: if the signal quality average is below this value the wireless link is disconnected.
- The three new parameters are used to compute this signal quality average. For more information see the flow chart on the next page.
- **Scan all Channels**: after a roaming disconnection, available access points are detected by a scanning operation. Scanning all channels takes 3 or 4 seconds (200ms per channel). To reduce this time and to be quickly reconnected, a subset of channels can be specified. Set this parameter to "No" and select/unselect each channel.

Note for Windows servers: to prevent TCP disconnections (RDP or ICA) when roaming, a registry value can be tuned:

- **Parameter:** HKEY_LOCAL_MACHINE-SYSTEM-CurrentControlSet-Services-Tcpip-parameters-TcpMaxDataRetransmissions
- **Default value**: 5
- **Advised value**: 20

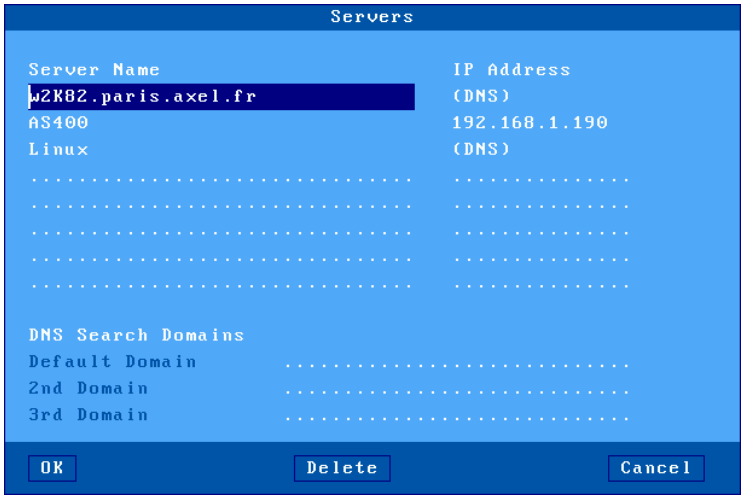
The following flow chart describes how the terminal computes the current 'Average RSSI'. This value computation is critical because a wireless disconnection will be done if the Average RSSI is lower than the terminal RSSI Threshold:



3.1.4 - Server Management

A server is a TCP/IP machine (Windows, Unix/Linux, AS/400, etc) to which the terminal can open connections.

To configure the server table, select the **[Configuration]-[Network]-[Servers]** menu. A dialog box as shown below is displayed:



The server definition depends on whether DNS is used:

- **No DNS**: a server is identified by both an alphanumeric character string and an IP address. (AS400 in the example)
- **With DNS**: a server is defined only by its name. This name can be either a full name (w2k8r2.paris.axel.fr) or an incomplete name (Linux). Its IP address is resolved later. (See Appendix A.4)

Add a Server: move the highlight cursor to a vacant line and enter the name and either its IP address or DNS name. (A server can also be added from the session profile dialog box.)

Delete a Server: select the server and press [Delete].

Change a Server: move the highlight cursor over the name or IP address of the server and enter the new value.

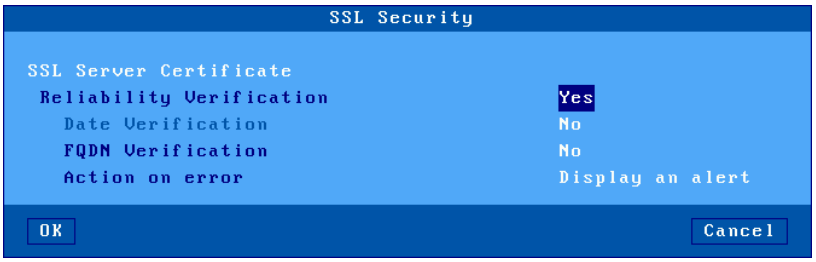
Note: the default DNS domains, previously defined through the DNS box are displayed for information (they can't be modified).

3.1.5 - SSL Security

When an SSL connection is established it is advisable to check the server certificate.

This requires a CA certificate to be installed in the AX3000 Local Store. See Chapter 3.6.4.

To configure the terminal SSL security policy, select the **[Configuration]-[Network]-[SSL Security]** menu. A dialog box as shown below is displayed:



The '**Reliability Verification**' option forces the server certificate to be checked against the terminal's local CA certificates when an SSL connection is established. (HTTPS or NLA). For this check to be possible there must be at least one CA certificate stored in the terminal's local store (see chapter 3.6.4). A check is made between the terminal's local CA certificates and the server's certificate.

With this setting enabled there are two further optional checks.

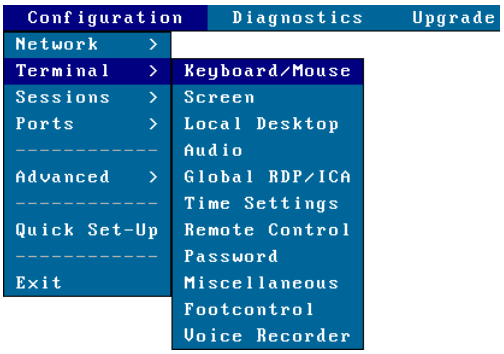
- **Date Verification** (requires an NTP time server to be configured - See Chapter 3.2.6): A check is made to confirm the connection request is initiated between the 'Valid After' and 'Valid Before' dates of the server certificate.
- **FQDN Verification**: A check is made against the server's FQDN or IP address as given in the certificate's 'Common Name' parameter

The **"Action on Error"** option sets the terminal's behavior when an SSL non-

compliant situation is met (See Chapter 4.3.3).

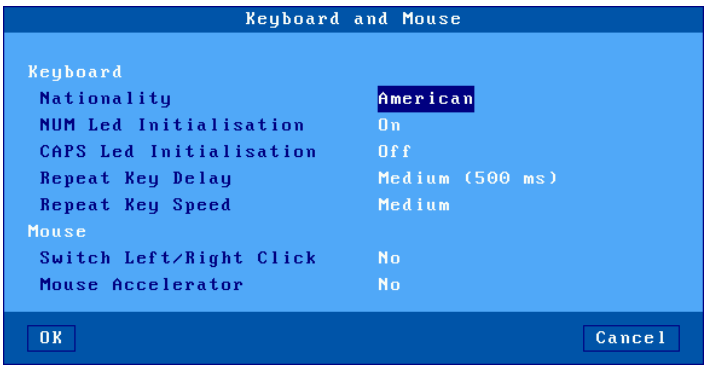
3.2 - GENERAL SETTINGS

The terminal general settings are available through the **[Configuration]-[Terminal]** menu:



3.2.1 - The Keyboard and the Mouse

Select the **[Configuration]-[Terminal]-[Keyboard/Mouse]** menu:



Keyboard parameters (PS/2 or USB):

- **Nationality**: select the nationality from a list

- **'NUM' Led Initialization**: this led lights when the AX3000 is switched on
- **'CAPS' Led Initialization**: this led lights when the AX3000 is switched on
- **Repeat Key Delay**: sets the duration of a key being held down before it starts to auto-repeat (values: no, low, medium or high).
- **Repeat Key Speed** (enabled only if the automatic repeat is set): select the automatic repeat speed when a key is held down (values: low, medium or high).

Mouse parameters (PS/2 or USB):

- **Switch Left/Right Click**: mouse button reversal
- **Mouse Accelerator**: can be helpful with wide screens.

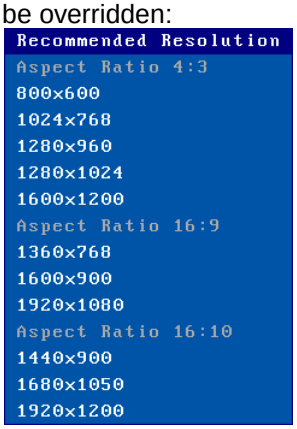
3.2.2 - The Screen

Select the **[Configuration]-[Terminal]-[Screen]** menu:

a) Graphical Environment

Parameters are:

- **Resolution**: the default value of the monitor is automatically detected and used, although this can be overridden:



  Note: the 'Recommended Resolution' option allows the best resolution to be selected when the terminal starts up.
- **Colors**: available values are 16, 24 and 32bpp.
- **Monitor Information**: this dialog box gives information about the monitor (manufacturer, recommended resolution, available resolutions…).

Note: when exiting the dialog box the graphical settings may be tested.

b) Screen Saver

Parameters are:

- **Screen Saver**: this function blacks out the monitor or displays logo after a certain time of inactivity. Either any keystroke or a password can be set to awaken the screen
  - No: function disabled.
  - Yes: function enabled. The display is restored when either the keyboard is used or data is received from the server.
  - Yes keyboard only: The display is only restored when the keyboard is used.

- **Display logo**: a logo can be displayed during the screen saver. This is either the logo displayed at the terminal boot-up or the logo stored in the AX3000 Local Store. See Chapter 3.6.4.
- **Energy Star Power Saver** (available only if the screen saver feature is enabled): this saves monitor power consumption.
- **Password** (available only if the screen saver feature is set): the lock screen feature is only available if a password is entered. For more information about the lock screen feature, see Chapter 4.7.2.
- **Delay (minutes)** (available only if the screen saver feature is set): delay before the monitor is turned off or locked.

c) Touch Screen

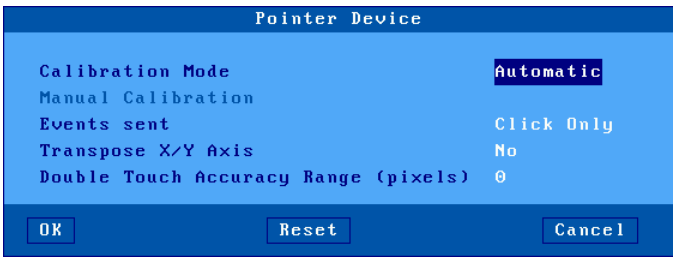
"Touch screen events" are automatically remapped into "mouse events". No additional drivers or settings are required on the server (Windows, Unix/Linux, AS/400...).

Note: multi-touch devices are supported but only with a RDP session connected to a RDS 2012 server or a Windows 8 computer.

Touch screen parameters:

- **Port**: serial touch screen port (Aux1, Aux2...)
  For a USB touch screen this parameter is disabled
- **Settings**: the box depends on the touch screen type (serial or USB).

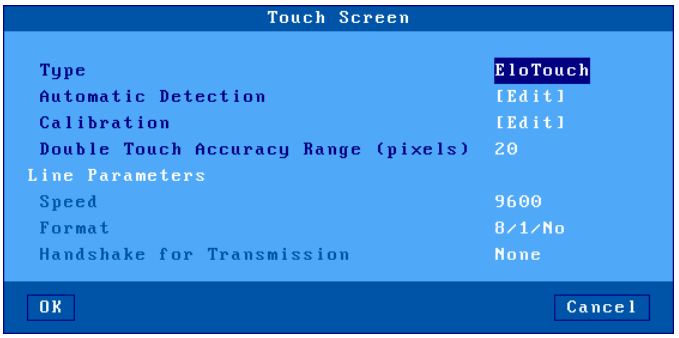
USB Touch Screen: the following dialog box is displayed:



Available options are:

- **Calibration Mode**: two values:
  - '**Automatic'** (only if the min/max values of USB touchscreen are given to the terminal)
  - '**Manual'**: see below
- **Manual Calibration**: display a dialog box for calibration. (Follow the instructions and touch the screen where '*'s are displayed).
- **Events sent** (USB touch screens only): two modes are available:
  - **Click Only**: a 'mouse click' event is sent when the screen is touched
  - **All**: in addition of the click event, 'mouse motion' events are sent until the screen is untouched.
- **Transpose X/Y Axis** (USB touch screens only): select 'yes' or 'no'.
- **Double Touch Accuracy Range (pixels)**: this parameter defines a zone size which allows double-click to be emulated. A double-click event will be sent when the screen is touched twice (in a period less than 0.5 seconds) and when the two impacts are located in the same zone (less than X pixels).

Serial Touch Screen: the following dialog box is displayed:



Available options are:

- **Type**: select the touch screen manufacturer: ELOTouch, MicroTouch or Liyitec.
- **Automatic Detection**: automatically obtain the set-up parameters from the touch-screen. To detect these settings the Axel terminal scans a range of baud rates and data formats. When these match the touch screen settings the serial line parameters are updated.

- **Calibration**: display a dialog box for calibration. (Follow the instructions and touch the screen where '*'s are displayed).
- **Double Touch Accuracy Range (pixels)**: same explanation the USB touch screen.

c) Dual Monitor

Axel terminals do not have two monitor connectors, so to maximize flexibility and our customer's investment in existing hardware we provide a solution that essentially "partners" two existing terminals.

The 'Dual monitor' allows the layout (horizontal or vertical) to be selected. In addition the MAC address of the second terminal must be given.

The Dual Monitor support must be specified for each RDP/ICA session. See Chapters 5.1.4 and 5.2.6.

For more information see Appendix A.6.

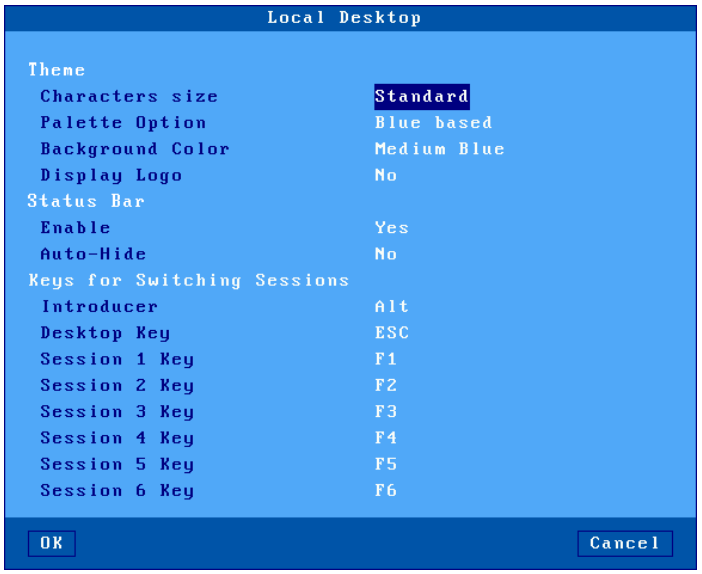
3.2.3 - Local Desktop

When no session is connected a specific screen is displayed. This is the 'Local Desktop'.

The terminal local desktop configuration provides:
- The theme (colors, logo, character size…),
- The status bar settings,
- Hot keys to flip between sessions.

The use of the local desktop is described in Chapter 4.2.

Select the **[Configuration]-[Terminal]-[Local Desktop]** menu:



a) Theme

The theme settings are:

- **Character Size**: standard or double.
- **Palette Option**: four templates are available.
- **Background Color**.
- **Display logo**: a logo can be displayed. This is either the Axel logo displayed at the terminal boot-up or a customer's logo loaded in the AX3000 Local Store. See Chapter 3.6.4.

b) Status Bar

An optional status bar can be enabled. It's located on the bottom of the screen. This status bar allows:

- The current session to be easily identified,
- The other connected session(s) to be easily seen,
- Switching sessions by clicking the label with the mouse.

A label (11-character string) is associated with each session. This label is by default the name of the connected server but it can be user-defined to any value. The label of the current session is displayed in reverse video mode. A session label is preceded by an indicator (circle):

- The circle is empty: the session is declared but not connected.
- The circle is filled in green: the session is connected

An auto-hide option is available:

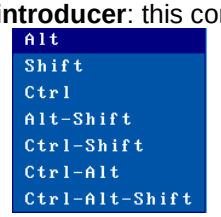
- Auto-hide enabled: the status bar is hidden. It's shown when the mouse cursor is left 2 seconds on the bottom of the screen.
- Auto-hide disabled: 20 pixels are used for the status bar. They are taken from the current session. For example, when a 1024x768 RDP session is connected, only 1024x748 is available for the TSE server.

Note: when a mass storage device is currently in use, a colored indicator is displayed on the right (green: read in progress, red: write in progress). **It's strictly forbidden to remove a USB device when currently in use**.

c) Multi-Session Keystroke

The keystrokes to move from one session to another can be customized: A session keystroke is composed by:

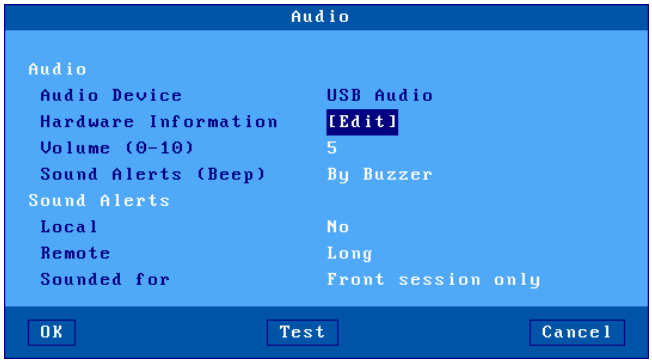
- **An introducer**: this combination is selected through a list:



- **Desktop key** (switch to the terminal local desktop) or a **Session X key** (switch to session X).

3.2.4 - Audio

Select the **[Configuration]-[Terminal]-[Audio]** menu:



a) Audio Device

When an audio device is detected its type is displayed (USB Audio). In this case the following options are available:

- **Hardware Information**: miscellaneous information.
- **Volume**: setting-up the volume (0=mute).
- **Sound Alerts**: selecting the output device: buzzer or audio device.

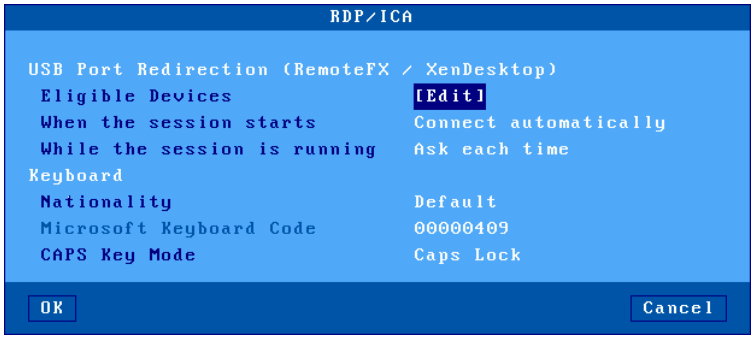
b) Sound Alerts

Sound alerts can originate from either the terminal (local) or the server (remote). Either can be disabled or have its duration set. (Values: no, short, long or very long.):

- **Local**: following an unexpected operation the terminal sounds a beep.
- **Remote**: the beep is requested by the server (escape sequence).
- **Sounded for**: set if the remote alert is played for "**Front session only**" or for "**Any session**".

3.2.5 - Global RDP/ICA

Select the **[Configuration]-[Terminal]-[Global RDP/ICA]** menu:



a) USB Port Redirection

The USB Port Redirection feature allows the thin client to act as a gateway between the USB device and the Windows server. The entire USB device management is provided by the Windows server.

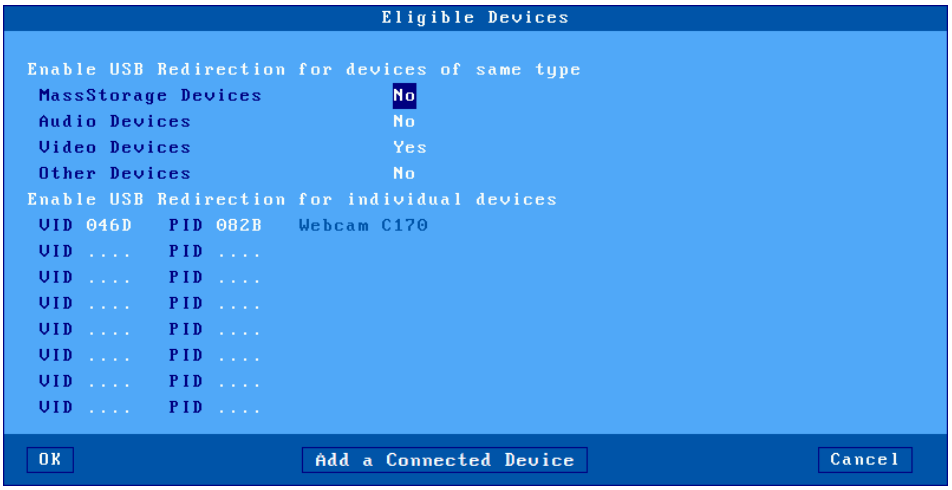
Note: this only works when the thin client is connected with the ICA protocol to a XenDeskop server or with the RDP protocol to a Server 2012 (or a Windows 8 machine)

The "**Eligible Devices**" dialog box allows a subset of USB devices of a certain class to be selected for the USB Port Redirection feature. See next page.

The "**When the session starts**" and "**While the session running**" options are described in Chapter 4.3.6.

Note: enable USB Port Redirection option in the RDP/ICA session profile.

Dialog box to select eligible USB devices:



A set of USB devices can be selected by **their types**:

- Mass Storage devices (memory sticks, hard drives, CD/DVD reader…)
- Audio devices
- Video devices (webcam)
- Other devices (not a mass storage, an audio or a video device. For example a scanner)

Alternatively a USB device can be selected by its identifier: Vendor ID and Product ID. These values can be manually entered or automatically obtained from a device currently connected by clicking the [Add a Connected Device] button.

b) Keyboard Nationality

When the nationality of the keyboard is not listed by the terminal setup, a country specific Microsoft keyboard code can be entered. This code is used when an RDP/ICA session is established and allows any keyboard nationality to be negotiated and supported by the terminal.

Note: The country code is only applied after a Windows connection is established – so is not available at the terminal setup level.

The RDP/ICA Keyboard parameters are:

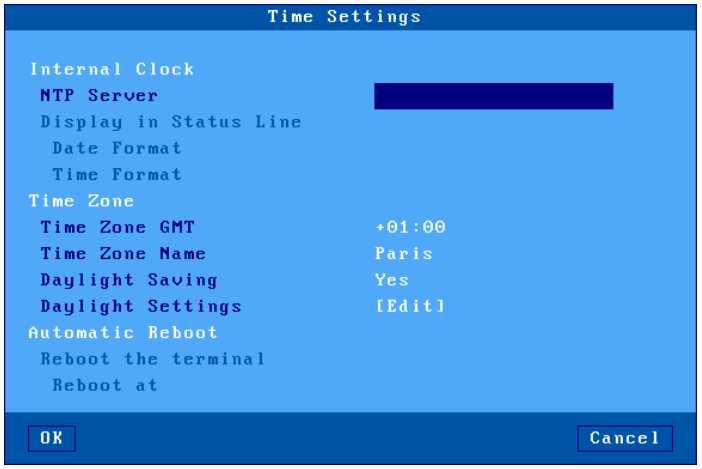
- **Nationality**: two possible values:
  - **Default**: the keyboard nationality is given by the [Configuration]-[Terminal]-[Keyboard] menu.
  - **Custom**: for nationalities not listed a custom keyboard nationality can be entered. (Microsoft Keyboard Code parameter)
- **Microsoft Keyboard Code**: enter the required keyboard code value. See Appendix A.8.4 for valid values.
- **CAPS Key Mode**: select "Shift Lock" or "Caps Lock".

3.2.6 - Time Settings

The time management is used for:

- Displaying date and time within the local status bar.
- Updating modification/creation file time (memory stick support)
- Automatic terminal reboot
- SSL Certificates verification

Select the **[Configuration]-[Terminal]-[Time settings]** menu:



a) Internal Clock

Unlike a PC, there is no local clock (with battery) in Axel terminals. To provide a local clock we have introduced support for a time client (NTP protocol). This

allows the time to be obtained when the terminal is powered on.

Enter the time server IP address (or the DNS name). This information can be automatically obtained via the DHCP protocol. (See Chapter 3.1.2).

The date and time can be displayed within the terminal status bar. The following option allows the display formats to be selected:

- **Date Format**: 'JJ/MM/AA' or 'MM/JJ/AA'
- **Time Format**: 'HH:MM' or 'hh:MM'. (For the second format the time is displayed 'modulo 12' with PM or AM after.)

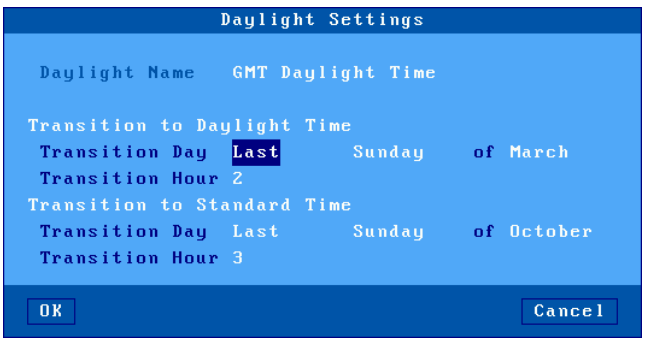
b) Time Redirection

The terminal negotiates its own local time zone. This allows different 'local times' to be displayed on terminals in different geographic regions?

Note: the time zone redirection function must be enabled on the Windows 2003 server. See Chapter 5.5.6.

The time zone parameters are:

- **Time Zone GMT**: positive or negative offset from GMT.
- **Time Zone Name**: a non-empty character string ("GMT Standard Time" by default). This character string must match one of the available Microsoft time zone name (case sensitive). See Appendix A.8.4.
- **Daylight Saving**: enabling daylight saving function.
- **Daylight Settings**: The following dialog box is displayed (Daylight time zone name is displayed):



Enter the following parameters for each transition time:

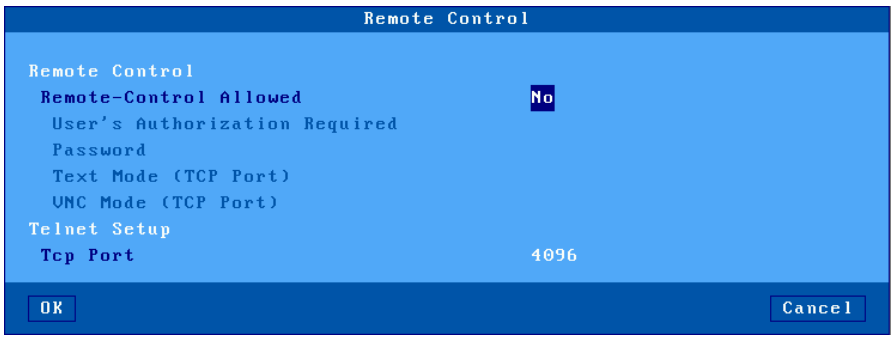
- **Transition Day**: day number, day and month. (For example: Last Sunday of March for daylight time.)
- **Transition Hour**: enter the hour without minute. (For example: 2 is 02:00.)

c) Automatic Reboot

When a NTP server is set, the terminal can be automatically rebooted (every day or a specific day). This can be used with the auto-configuration feature.

3.2.7 - Terminal Remote Control

Select the menu **[Configuration]-[Terminal]-[Remote Control]**:



a) Remote Control

This functionality allows an administrator to remotely take control of a terminal. The administrator can passively watch the users screen or actively take control with his own keyboard for various support or administration purposes.

The parameters are:

- **Remote-Control Allowed**: yes or no.
- **User's Authorization Required**: when this parameter is set the remote control must be accepted by the current user of the terminal.
- **Text Mode (TCP Port)**: remote control only for text-based session (terminal set-up, telnet, 5250 & 3270)
- **VNC Mode (TCP Port)**: global remote control

- **Password** (optional): this password will be requested when the connection is established.

For more information, refer to Chapter 10.2.

b) Telnet Set-Up

This functionality allows the terminal set-up to be addressed by a telnet client.

The single parameter is the TCP port (4096 by default).

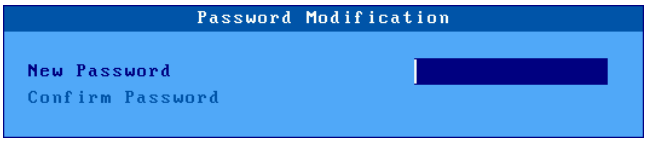
For more information, refer to Chapter 10.3.

3.2.8 - Password

Access to the set-up menus can be controlled by a password.

a) Setting the Password

Select the **[Configuration]-[Terminal]-[Password]** dialog box to set, change or delete the set-up password:

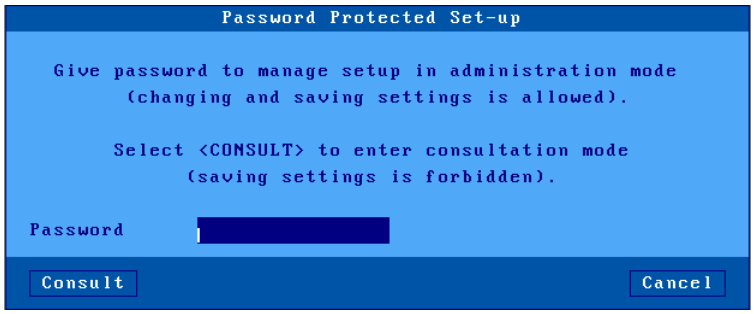


Enter the following parameters:

- **Enter a new password**: enter a new password of maximum 15 characters, or press <CR> if no password is required or to delete existing password.
- **Retype password**: re-enter the identical password.

b) Entering Set-Up

If the set-up is password protected, the following dialog box will be displayed the next time access is attempted:



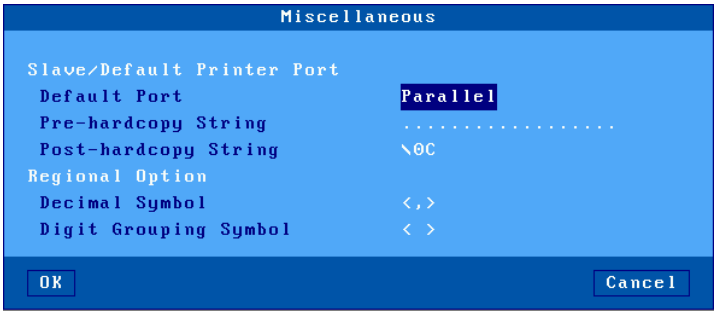
Three operations are permitted:

- Enter the password to access the set-up
- Press **<Esc>** or select the [Cancel] button to exit set-up mode
- Select the [Consult] button to access the set-up without using the password. All set-up operations will be permitted but **it will not be possible to save the modifications**.
  The Consultation mode is not offered if the "Administrator Hot Key disabled" option is set to "No". (See Appendix A.8.2)

IMPORTANT: if the password is not known, the super password '**yaka**' can be used. (Only from the local interactive set-up and only if "Administrator Hot Key disabled" is set to "No". See Appendix A.8.2)

3.2.9 - Miscellaneous

Select the **[Configuration]-[Terminal]-[Miscellaneous]** menu:



a) Default Printer Port

The default port is used for screen dumps or to select the default port for printing via escape sequences (for text-mode emulations).

Printer parameters:

- **Default port**: select the port from a list.
- **Pre-hardcopy String** (available if "default port" isn't "none"): character string sent before a hardcopy.
- **Post-hardcopy String** (available if "default port" isn't "none"): character string sent after a hardcopy (for example "\0C" is a form feed)

Note: If "Choose Portrait/Landscape" is enabled (see Appendix A.8.2), the parameter "**Pre-hardcopy String**" is replaced by the two parameters "**Portrait Pre-print String**" and "**Landscape Pre-print String**".

b) Regional Option

These two options allow numbers to be distinguished when a copy/paste operation is done from a text-based session to an RDP/ICA session. (Useful when the paste operation is done to spreadsheet software).

The decimal symbol can be a comma or a dot.

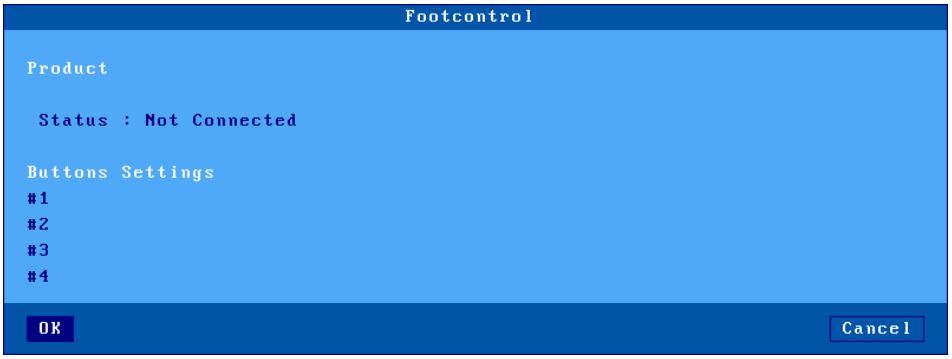
The digit grouping symbol can be a dot, a comma or a space.

3.2.10 - Footcontrol

The Axel terminal can locally manage a footcontrol switch. A keystroke is associated with each pedal.

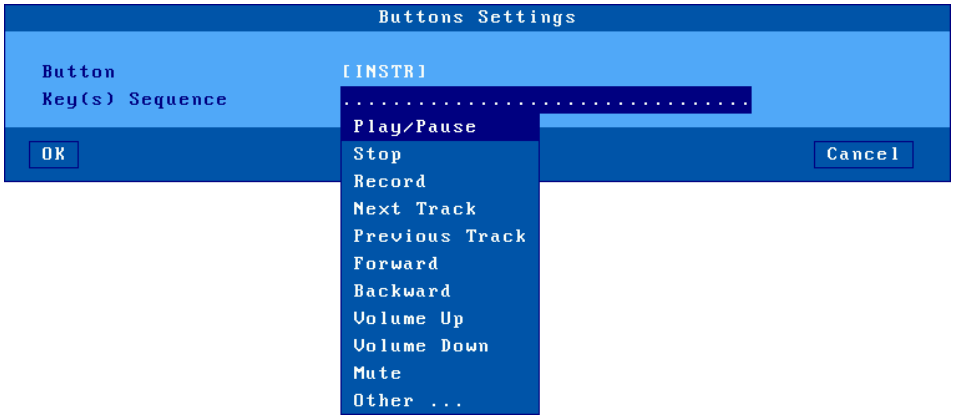
Note: this feature is available with the HID firmware option and works only with RDP, ICA and 5250 sessions.

Select the **[Configuration]-[Terminal]-[Footcontrol]** menu:



Up to 4 buttons (i.e pedals) can be programmed. Select the button number. The following box is displayed:

The next step allows an 'audio' action to be associated with this button. (or another keystroke can be associated by <Other…>:



3.2.11 - Voice Recorder

The Axel terminal can locally handle Dictation (Philips Speechmike and Olympus). The concept is associating a keystroke with each button.

Select the **[Configuration]-[Terminal]-[Voice Recorder]** menu. The configuration process is the same as the Footcontrol. See previous chapter.

Note: this feature is available with the SMK firmware option and works only with RDP, ICA and 5250 sessions.

3.3 - SESSION SETTINGS

The AX3000's built-in multi-connection capability allows simultaneous access to up to 6 different servers.

Each session can be used:

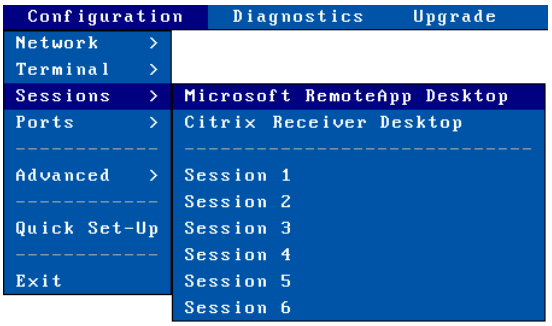
- Either by the application desktop: RemoteApp or Citrix Receiver
- Or by predefined session settings (server, protocols, resolution…)

3.3.1 - Application Desktop (RemoteApp or Citrix Receiver)

This feature allows a user, after authentication, to get icons of his published resources (application(s) or desktop(s)) to be displayed on the terminal's local desktop.

Launching a published resource is simply done by clicking the associated icon. In this scenarioan RDP/ICA session is automatically established.

To configure the Application Desktop go to **[Configuration]-[Sessions]** menu and select either the **[Microsoft RemoteApp desktop]** or the **[Citrix Receiver Desktop]**:



Notes:

- Some terminal sessions are reserved for the use of applications.
- The number of reserved sessions is from 1 to 6.
- The application sessions are always set up descending from session number 6. For example if three sessions are reserved they will be sessions 6, 5 and 4.

To illustrate this principle below are two examples of session setup

Example 1: terminal dedicated to "Application Desktop"

Reserved	Reserved	Reserved	Reserved	Reserved	Reserved

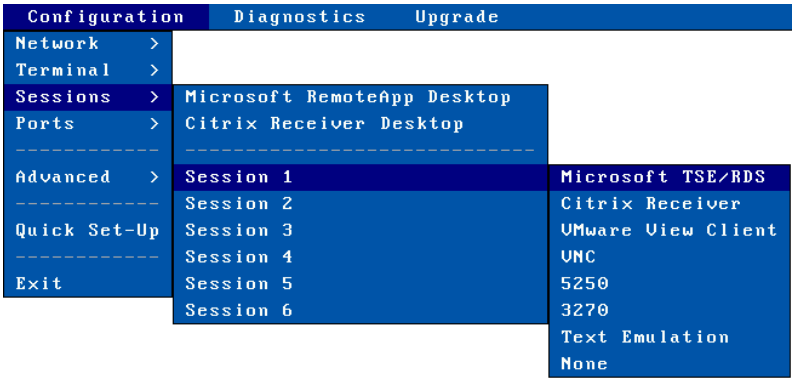
Example 2: "Application Desktop", VNC and ANSI sessions

VNC	ANSI	Reserved	Reserved	Reserved	Reserved

For more information refer to Chapter 5.3.

3.3.2 - Predefined Sessions

Select the **[Configuration]-[Sessions]-[Session X]** menu (where **X** is the session number). The "Session Type" list is displayed:



Note: if the session was already associated with a "Session Type" the related dialog box is displayed.

a) Session Types

Microsoft TSE/RDS: connections to Windows TSE servers (from NT4 to 2012). For more information see Chapter 5.1.

Citrix Receiver: connections to Citrix Metaframe, XenApp/XenDesktop and VDI-in-a-Box servers. For more information see Chapter 5.2.

VMware View Client: connections to VMware View server. For more information see Chapter 5.4.

VNC: Graphical session to Unix/Linux. For more information see Chapter 8.2.

5250: Text mode session to AS/400. For more information see Chapter 6.

3270: Text mode session to OS/390. For more information see Chapter 7.

Text Emulation: Network (**telnet, ssh** and **tty** protocols) or serial (**aux1** and **aux2** ports) text mode sessions generally used for Unix/Linux connections. See Chapter 8.1.

None: This session is not available for the user.

b) Duplicating Session Settings

The settings of a "source" session may be duplicated to a 'destination' session.

In the **[Configuration]-[Sessions]** menu, select the source session and press <Ctrl><C>. Then select the destination session and press <Ctrl><V>.

After confirmation, the source session settings are applied to the destination session.

3.4 - USB MANAGEMENT

3.4.1 - Specifications

Technical specifications:

- Supported speeds: Low-speed (1.5 Mbits), Full-speed (12 Mbits) and High-speed (480 Mbits)
- Maximal consumption: 500 mA (total current draw for all ports)

Important Note: power hungry non-computing USB devices must not be connected to the terminal (fans, lights…) as they have the potential to draw too much current and cause damage to the terminal.

The following USB devices are supported:

- Keyboard,
- Barcode reader,
- Mouse,
- HUB,
- Printer,
- USB-RS232 adaptor,
- Touch screen (classic or multi-touch),
- Mass storage device (memory stick, hard drives, CD/DVD readers…),
- Smartcard reader (or security USB dongle from Aladdin),
- Audio device.

Other USB devices are detected but not supported.

USB devices are hot-pluggable and are dynamically detected by the Axel terminal.

Maximum number of connected USB devices:

- Four keyboards and barcode readers,
- Three mice,
- Two HUBs,
- Four printers or USB-RS232 adaptors,
- One touch screen.
- One mass storage device,
- Two smartcard readers.
- One audio device.

3.4.2 - Connecting a USB Keyboard

The USB keyboard is automatically detected by the Axel terminal.

The USB keyboard settings (nationality, LED initialization...) are displayed and can be changed in the AX3000's General Parameters. For more information see Chapter 3.2.1.

Note: multiple keyboards (USB and/or PS2) can be connected. The same settings are used for both and they can be used simultaneously.

3.4.3 - Connecting a USB Barcode Reader

The USB barcode reader is automatically detected by the Axel terminal. A barcode reader is treated as a keyboard. See previous chapter.

3.4.4 - Connecting a Mouse

A USB mouse is automatically detected by the Axel terminal. No specific settings are required.

Note: multiple mice (USB and/or PS2) can be used simultaneously.

3.4.5 - Connecting a HUB

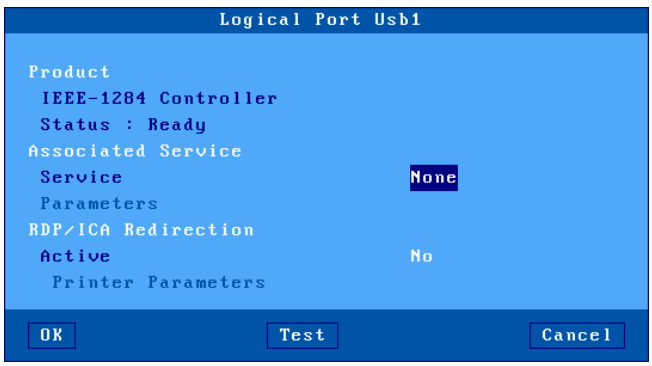
A USB HUB is automatically detected by the Axel terminal. No specific settings are required.

3.4.6 - Connecting a Printer

a) Logical Port Attachment

When a USB printer is connected for the first time to the Axel terminal a logical port is associated. Four logical ports are available: Usb1, Usb2, Usb3 and Usb4.

The associated logical ports are listed in the menu **[Configuration]-[Ports]-[USB Logical Ports]**. To get information of a USB printer, select its logical port. For example:



This association is maintained even if the printer is powered off, disconnected or connected to the other USB port.

Releasing a logical port is a manual operation (see Chapter below 'Releasing a Logical Port').

b) Setting-Up

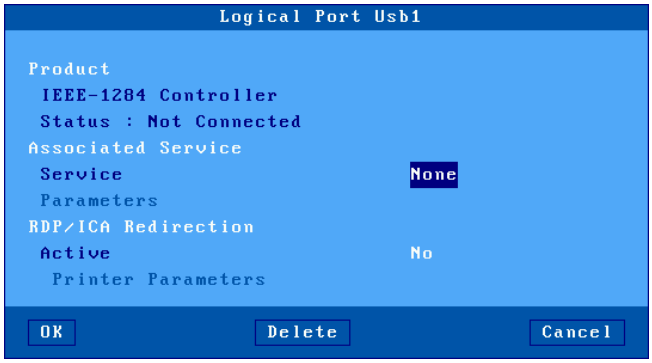
The USB printer set-up procedure is the same as a serial or parallel printer.

For more information, see Chapter 3.5.2 and the following.

c) Releasing a Logical Port

A logical port must be manually released. This operation can be performed only when the USB device is no longer connected.

In the menu **[Configuration]-[Ports]-[USB Logical Ports]** select the logical port. The following box is displayed:



Select the [Delete] button to release the logical port.

The released logical port is removed from the list of the associated ports and is now available for the next USB device.

3.4.7 - Connecting a USB-RS232 Adaptor

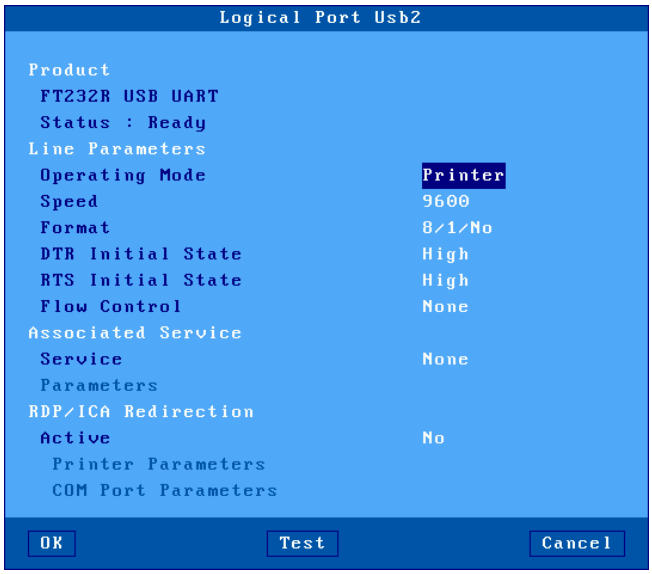
a) Overview

A USB-RS232 adaptor is normally a cable with USB connector at one end and one or more serial connectors (DB9 or DB25) at the other end. This allows serial devices to be connected when no native serial ports are available.

This technology is sometimes embedded in USB devices. For example touch screens or card readers. These devices have a USB connector but are based on serial technology and are seen as serial ports.

b) Configuration

A logical USB port is allocated to the USB-RS232 adaptor. (See attaching and releasing operations in the Chapter 3.4.6). For example:



This USB logical port allows the adaptor to be configured: line parameters (baud rate, format...), service and RDP/ICA redirection. For more information see Chapter 3.5.1.

3.4.8 - Connecting a Touch Screen

A USB touch screen may be seen by the terminal:
- Either as a multi-touch device
- Or as a pointer device
- Or as an USB-RS232 adaptor. In this case a logical USB port is automatically created (see Chapter 3.4.7).

In both cases, to set-up the touch screen, select the menu **[Configuration]-[Terminal]-[Screen]**. For more information see Chapter 3.2.2.

3.4.9 - Connecting a Mass Storage Device

Most USB mass storage devices fall in one of the categories below:
- memory sticks,
- hard drives,
- CD/DVD readers,
- floppy disks,
- memory card readers,
- digital cameras.

The main difference between these devices is the type of file system (i.e the format in which the data is stored).

IMPORTANT: only mass storage devices formatted in FAT12, FAT16, FAT32 and ISO9660 are supported.

For your information the following table lists the most common file systems for each device type (√: supported by a PC or Axel, ○: supported only by a PC):

USB Mass Storage Device	FAT	NTFS	exFAT	ISO 9660	UDF	PIMA	Other
Memory Sticks	√	○	○				
Hard Drive	√	○	○				
CD/DVD Readers				√	○		
Floppy Disk	√						
Digital Cameras	√					○	○
Memory Card Readers	√						

File systems generally used on most common storage devices

Mass storage devices must be setup at two levels:

- General: see Chapter 3.2.5
- Per Session: see Chapters 5.1.6 and 5.2.8

Note: The status bar (see Chapter 3.6.2) gives an indicator showing when the device is being accessed

It's strictly forbidden to remove a device currently in use as the file system could be damaged and the integrity of the storage device lost.

3.4.10 - Connecting a Smartcard Reader

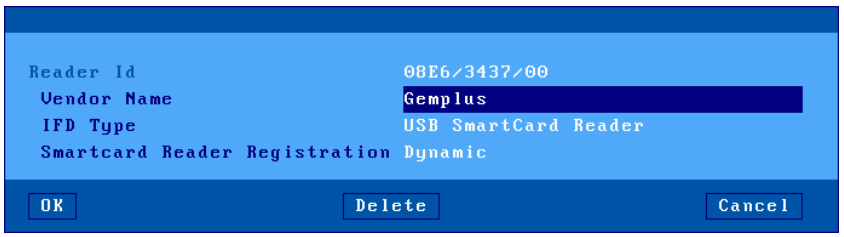
This function is designed for **PC/SC-compliant** smartcard readers. Two readers are supported by the Axel terminal:

- CCID readers,
- Aladdin eToken.

Note: Some "non-PC/SC" readers are also supported. This is achieved with the RDP/ICA COM port redirection (or by the tty protocol for Unix/Linux). In this case RS232 devices or USB-RS232 devices must be used (see Chapter 3.4.7).

For the PC/SC devices, a "reader store" is maintained by the terminal. This store is accessed by the **[Configuration]-[Advanced]-[Smartcard Readers]** menu:

A reader is automatically added to the store when being connected for the first time. Up to four readers can be stored. To consult or change reader characteristics select the entry. A dialog box as shown is displayed:



Smartcard reader parameters are:

- **Reader ID**: this value can't be modified. It's composed by the "Manufacturer ID" and "Product ID".

- **Vendor Name**: character string sent back by the terminal when a SCardGetAttrib (option SCARD_ATTR_VENDOR_NAME) command is issued by a Windows PC/SC application.
- **IFD Type**: character string sent back by the terminal when a SCardGetAttrib (option SCARD_ATTR_VENDOR_IDF_TYPE) command is issued by a Windows PC/SC application.
- **Smartcard Reader Registration**: generally a reader must be attached to the terminal to be enumerated by a PC/SC application (SCardListReaders command). Some readers have to be listed even when they are not attached (for example a token - reader and smartcard are integrated in a memory stick). This parameter allows the method to be selected: dynamic or persistent.

The **[Delete]** allows this store entry to be deleted.

The use of a smartcard reader is enabled/disabled per session. See Chapters 5.1.6 and 5.2.8.

3.4.11 - Connecting a USB Audio Device

The USB audio device is automatically detected by the Axel terminal.

The use of an audio device is enabled/disabled per session. See Chapters 5.1.6 and 5.2.8.

3.4.12 - Listing Connected USB Devices

To list all connected USB devices (supported or not) select the menu **[Diagnostics]-[USB]**. For more information see Chapter 9.6.

3.5 - SETTING AUXILIARY AND LOGICAL PORTS

Three types of ports are available for peripheral devices:

- **Auxiliary ports**: one parallel port, two native serial ports (Aux1 and Aux2).
- **USB logical ports**: a USB logical port is automatically created when a USB printer or a USB-Serial adaptor is connected. Four USB logical ports are available (see Chapters 3.4.6 and 3.4.7)
- **Network Printers**: a TCP logical port (Net1 to Net4) allows a network printer (or a network print server) to be addressed in the same way as a local printer.

The AX3000 (auxiliary and logical) ports can be accessed in various ways:

- By a network service (lpd, tty, prt5250, etc). The management of the ports is independent of the active screen session.
- By an RDP or ICA session (see Chapter 5).
- By escape sequences (transparent mode or embedded printing). This provides compatibility with applications designed for serial terminals.

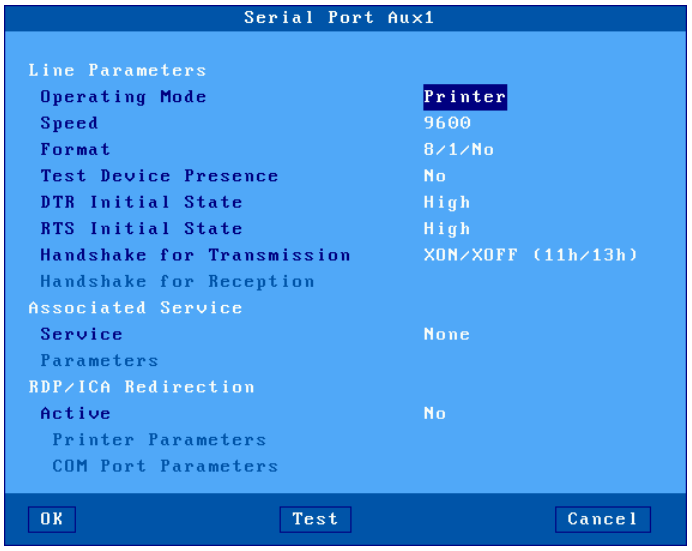
3.5.1 - Setting Up the Ports

This chapter covers selecting, setting up and choosing the network service for each port. (Also see Chapter 3.5.2)

Note: within the dialog boxes the **[Test]** button verifies communication between the AX3000 port and the connected device. This test works in all port configurations.
Warning: if ASCII format is not supported by the printer, the banner won't be displayed.

a) Setting Serial Ports

Select the **[Configuration]-[Ports]-[Auxiliary Ports]-[AuxX]** dialog box to configure each auxiliary serial port:



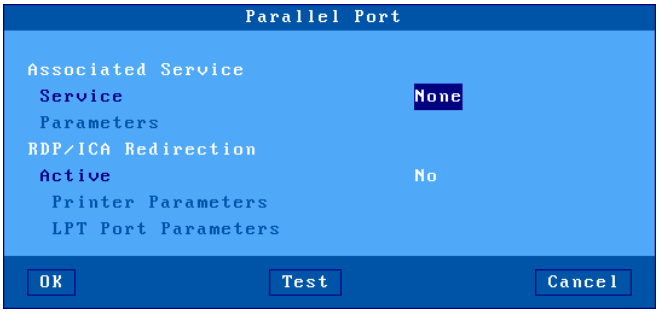
These parameters are:

- **Operating Mode**: three modes are available:
  - **Printer**: data flow takes place one way only (from the AX3000 to the serial peripheral device). However handshaking between the peripheral and the AX3000 is performed.
  - **Bi-directional Device**: Used to control peripherals such as bar code readers, touch screens, scales etc
  - **ASCII to EBCDIC**: this mode allows ASCII data received by the auxiliary port to be converted to EBCDIC (AS/400) format and be placed in the keyboard buffer. This is useful for connecting PC based peripherals (scanners, scales, etc) to an AS/400 application.
    Note: the 'associated service' must be set to 'none' and this port must be set as the AX3000 default auxiliary port (select the [Configuration]-[Terminal]-[Miscellaneous] menu).

- **Aux. Command** (only for "ASCII to EBCDIC" mode): an ASCII character string may be sent to the serial device. This is done by pressing the "Send Aux. Command" keystroke. (AltGr-F2 by default)
  Example: requesting weight data from scales.
- **Speed**: selected from a list (from 300 to 115,200 bits per second).
- **Format**: data format is selected from a list: data length (7 or 8 bits), stop bit and parity (none, odd or even).
- **Test Device Presence**: the CTS signal can be used by the AX3000 to detect the peripheral's presence.
- **DTR Initial State**: select 'high' or 'low'.
- **RTS Initial State**: select 'high' or 'low'.
- **Handshake for Transmission**: handshake used by the peripheral to control the AX3000's data flow.
- **Handshake for Reception** (available only in bi-directional mode): handshake used by the AX3000 to control the peripheral's data flow.
- **Associated Service** (ldp, prt5250, tty...): see Chapter 3.5.2 and following.
- **RDP/ICA Redirection**: see Chapter 5.

b) Setting the Parallel Port

Select the **[Configuration]-[Ports]-[Auxiliary Ports]-[Parallel]** dialog box to configure the parallel port:



The dialog box parameters are:

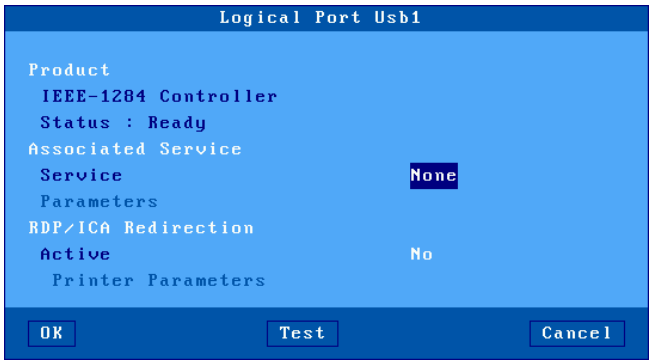
- **Associated Service** (ldp, prt5250, tty...): see Chapter 3.5.2 and following.
- **RDP/ICA Redirection**: see Chapter 5.

c) Setting USB Logical Ports

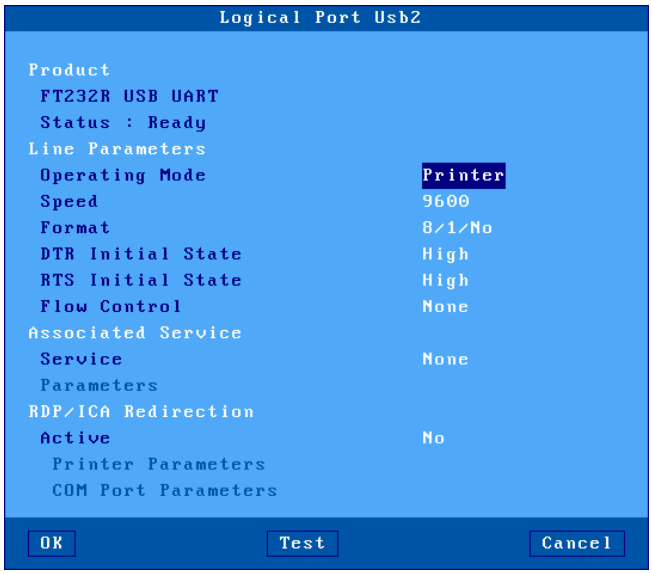
Select the **[Configuration]-[Ports]-[USB Logical Ports]-[UsbX]** dialog box to configure a USB logical port.

Note: a USB logical port can be associated with a printer or a USB-RS232 adaptor.

Example of a dialog box for a USB printer:



Example of a dialog box for a USB-RS232 adaptor:

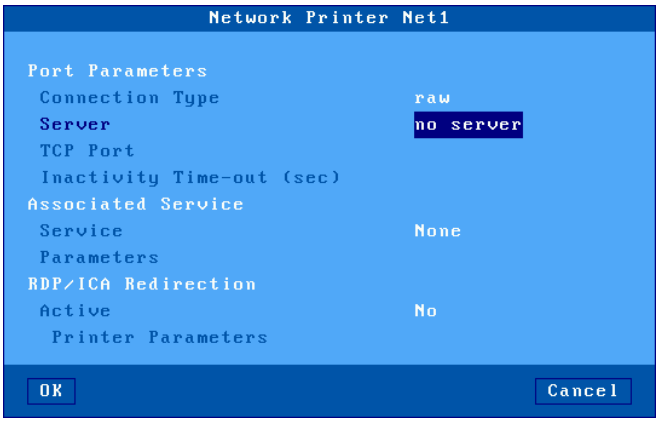


The dialog box parameters are:

- **Line Parameters** (USB-RS232 adaptor only): see the serial ports Chapter.
- **Associated Service** (ldp, prt5250, tty...): see Chapter 3.5.2 and following.
- **RDP/ICA Redirection**: see Chapter 5.

d) Setting Network Printers

Select the **[Configuration]-[Ports]-[Network Printers]-[NetX]** dialog box to configure TCP logical ports:



The following parameters can be set:

- **Connection Type**: always 'raw'
- **Server**: select the server (i.e. network printer) from a list.
- **TCP Port**: usual value is 9100.
- **Inactivity Time-out (sec)**: the session is automatically disconnected after this inactivity delay.
- **Associated Service** (ldp, prt5250, tty...): see Chapter 3.5.2 and following.
- **RDP/ICA Redirection**: see Chapter 5.

3.5.2 - Connecting a Printer

This chapter describes the set-up for an LPD printer attached to the AX3000.

LPD is a universal network printing protocol supported by all operating systems. Often there may be a better protocol to use, for example:

- RDP/ICA redirection: for Windows TSE (see Chapter 5.1.6 and 5.2.8).
- Prt5250: specific for OS/400 (see Chapter 6.3),
- Prt3270: specific for S/390 (see Chapter 7.3),
- tty: specific for Unix/Linux (see Chapter 5.3),

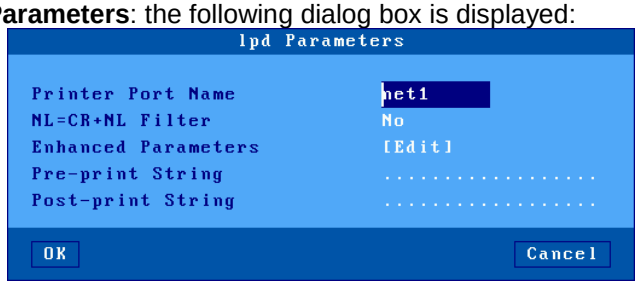
The embedded LPD print server allows the remote printer to be accessed as a standard system printer.

An LPD printer requires three parameters:

- The AX3000's IP address or FQDN name if DHCP/DNS is used,
- An identifier for the auxiliary port (user selectable character string),
- An optional filter to pre-process the file before printing (but generally this processing is done by the operating system level).

To set the LPD service on a port, select the **[Configuration]-[Ports]-[xxx]-[yyy]** dialog and enter the following parameters:

- **Service**: select lpd.
- **Parameters**: the following dialog box is displayed:



- **Printer Port Name**: this is the port identifier. Sometimes the same name is used for the printer at the operating system level.
- **NL=CR+NL Filter**: The line feed character (0Ah) can be mapped to carriage return + line feed (0Dh + 0Ah),
- **Enhanced parameters**: see Appendix A.8.3,
- **Pre-print String**: character string sent before the print job.
- **Post-print String**: character string sent after the print job (for example "\0C" is a form feed)

Note 1: If "Choose Portrait/Landscape" is enabled (see Appendix A.8.2), the parameter "**Pre-print String**" is replaced by the two parameters "**Portrait Pre-print String**" and "**Landscape Pre-print String**".

Note 2: if a serial port is used for printing, set the operating mode to 'Printer'.

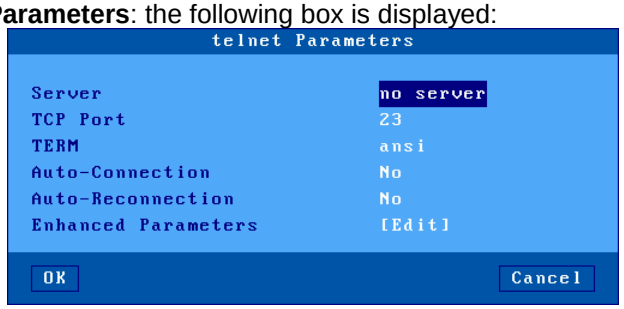
For more information about lpd printers, refer to the chapter related to your operating system in this manual.

3.5.3 - Connecting a Serial Terminal

Two serial terminals can be attached to the AX3000's serial ports. These serial terminals communicate with the target server(s) using the AX3000's embedded telnet service.

To configure the telnet service for the chosen serial port, select the **[Configuration]-[Ports]-[xxx]-[yyy]** dialog and enter the following parameters:

- **Service**: select telnet.
- **Parameters**: the following box is displayed:



- **Server**: selected from the server table (see Chapter 3.1.4). A new server can be added by selecting 'IP address' or 'Server Name'.
- **TCP Port**: usual value is 23.
- **TERM**: the value of this variable is 'negotiated', between the server and the AX3000.
- **Auto-Connection**: if this parameter is set to 'yes', the connection will be automatically established when the AX3000 is powered-up. Alternatively the user can press any key on the serial terminal keyboard to initiate the connection.
- **Auto-Reconnection**: if this parameter is set to 'yes' a new connection is automatically established after a disconnection. If set to 'no' the user can press any keyboard key to establish a new connection.
- **Enhanced parameters**: see Appendix A.8.3.

Note: the serial auxiliary port used must be configured for 'bi-directional' operating mode.

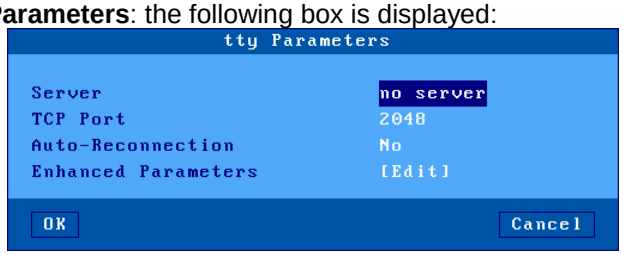
3.5.4 - Connecting other Peripherals

The Unix/Linux tty service provides bi-directional control of the device.

Note: only the two serial auxiliary ports are bidirectional. For other ports (parallel and logical ports) the tty service acts as a unidirectional service.

To set the tty service on the port, enter the following parameters in the **[Configuration]-[Ports]-[xxx]-[yyy]** dialog box:

- **Service**: select tty.
- **Parameters**: the following box is displayed:



  - **Server**: selected from the server table (see Chapter 3.1.4). A new server can be added by selecting 'IP address' or 'Server Name'.
  - **TCP Port**: usual value is 2048.
  - **Auto-Reconnection**: if this parameter is set to 'yes', a new connection is automatically established after a disconnection. Otherwise, the AX3000 must be power-cycled.
  - **Enhanced parameters**: see Appendix A.10.3.

Note: Axel provides a **Unix/Linux utility** called axtty by which pseudo-devices (/dev/ttypx) may be linked to the AX3000 serial ports. The AX3000 ports appear as local UNIX '/dev/xxx' ports. For more information, see Chapter 8.4.

3.5.5 - Using a Serial Port as the Main Port of a Session

A screen session can be associated with a serial port. This session now connects as a serial dumb terminal.

Serial and TCP/IP screen sessions can be used at the same time.

For more information see Chapter 8.1.2 (sub-section d).

3.5.6 - Other Uses

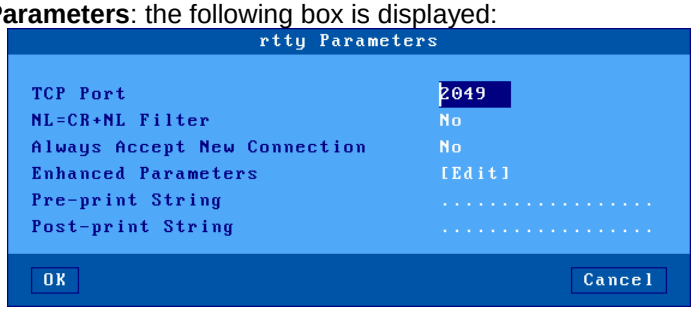
a) Using rtty

With the rtty service, the AX3000 acts as a server. The AX3000 "listens" on a given TCP port. Then, a connection can be established from a Windows or Unix box to send or received data.

Note: the rtty service can also be used with the Axel daemon (axttyd) under UNIX (see Chapter 8.4).

To set the rtty service on the port, enter the following parameters in the **[Configuration]-[Ports]-[xxx]-[yyy]** dialog box:

- **Service**: select rtty.
- **Parameters**: the following box is displayed:



- **Port TCP**: numeric value associates to this auxiliary port.
- **NL=CR+NL Filter**: The line feed character (0Ah) can be mapped to carriage return + line feed (0Dh + 0Ah),
- **Always Accept New Connection**: set the AX3000 behavior when an rtty connection is already established and a second connection rtty is received.
- **Enhanced parameters**: see Appendix A.8.3.
- **Pre-print String**: character string sent before the printing.
- **Post-print String**: character string sent after an the printing (for example "\0C" is a form feed)

Note: If "Choose Portrait/Landscape" is enabled (see Appendix A.8.2), the parameter "**Pre-print String**" is replaced by the two parameters "**Portrait Pre-print String**" and "**Landscape Pre-print String**".

b) Using the rsh Command to Print

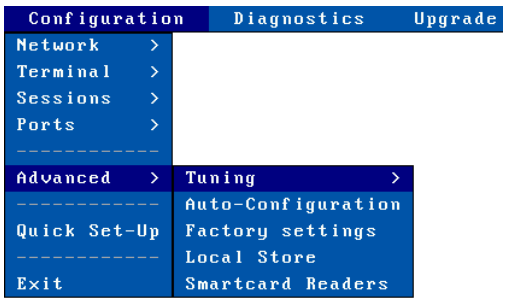
The embedded rcmd service allows printing with the rsh command (or rcmd command, according to the operating system used).

To set the rcmd service on the required auxiliary port, select the rcmd service from the **[Configuration]-[Ports]-[xxx]-[yyy]** dialog box. Then enter the name of the associated printer port.

For more information about the rsh command, refer to Chapter 8.3.3.

3.6 - OTHER FUNCTIONS

Less-used functions are available through the **[Configuration]-[Advanced]** menu:



3.6.1 - Tuning

This box offers special terminal operating parameters. Usually the default values are suitable.

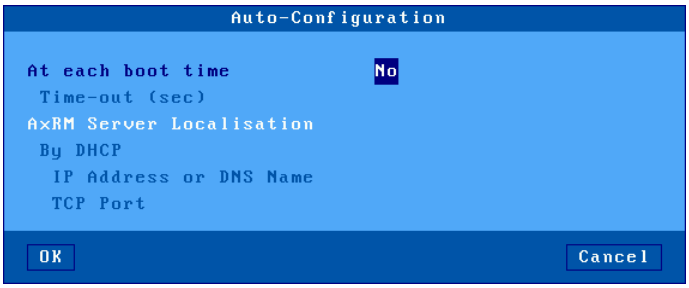
For more information see Appendix A.8.2.

3.6.2 - Auto-Configuration

The Auto-Configuration function lets a terminal check if new firmware and/or new configuration files are available.

This function is automatically started when the terminal is powered-on for the very first time. See Chapter 2.2.

Additionally this function can also be set to run each time the terminal boots:



The 'time-out' parameter is the maximum number of seconds allowed for the terminal to load a new firmware/configuration. If nothing is received in this time the terminal boots up using existing current settings.

Two methods are available for the terminal to locate the AxRM server (IP address and TCP port):

- **Static**: the IP address (or the name) and the TCP port are entered
- **Dynamic** (only if DHCP is already used to get the terminal IP address): the IP address and TCP port are given through the DHCP protocol (see Chapter 2.2.3 for more information).

For more information about Auto-Configuration stages, refer to Chapter 2.2.

3.6.3 - Factory Settings

This allows, after confirmation, terminal factory settings to be reloaded. **The current configuration is lost**. See Appendix A.8.1.

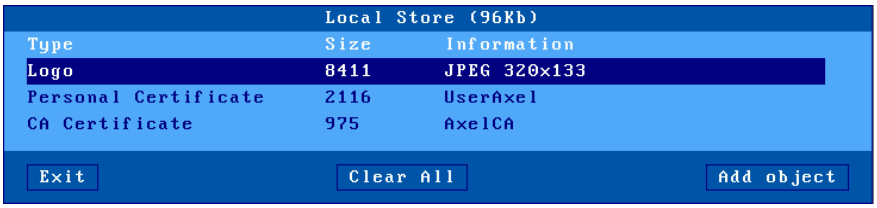
3.6.4 - Local Store

The AX3000 Local Store allows the following types of object to be stored:

- TSE License: sent by a TSE/RDS Microsoft server
- Printer Properties: sent by a TSE/RDS Microsoft server when printer redirection is enabled. See Chapter 5.

- Logo: JPEG picture. (Only one logo can be stored.)
- Personal certificate: PFX, PEM and P12 types are supported.
- Root certificate (CA): PEM and CER types are supported.

The dialog box below shows an example of AX3000 Local Store:



Adding objects: "TSE License" and "Printer properties" are issued by the TSE server., Logos and certificates can be copied from a memory stick by by clicking the **[Add object]** button or transferred over the network by using AxRM (Axel software management). For more information, please consult the manual *Axel Remote Management V3.*

Removing objects: an object can be removed by pressing <Del>. The entire local store can be cleared in a single operation by clicking the button **[Clear All]**. These operations can also be performed with AxRM.

3.6.5 - Smartcard Readers

This allows the smartcard readers actually 'known' by the terminal to be listed. For more information, see Chapter 3.4.10.

- 4 -
USING THE AX3000

This chapter covers use of the AX3000.

4.1 - SWITCHING ON THE AX3000

The following operations are performed when the terminal is turned-on:

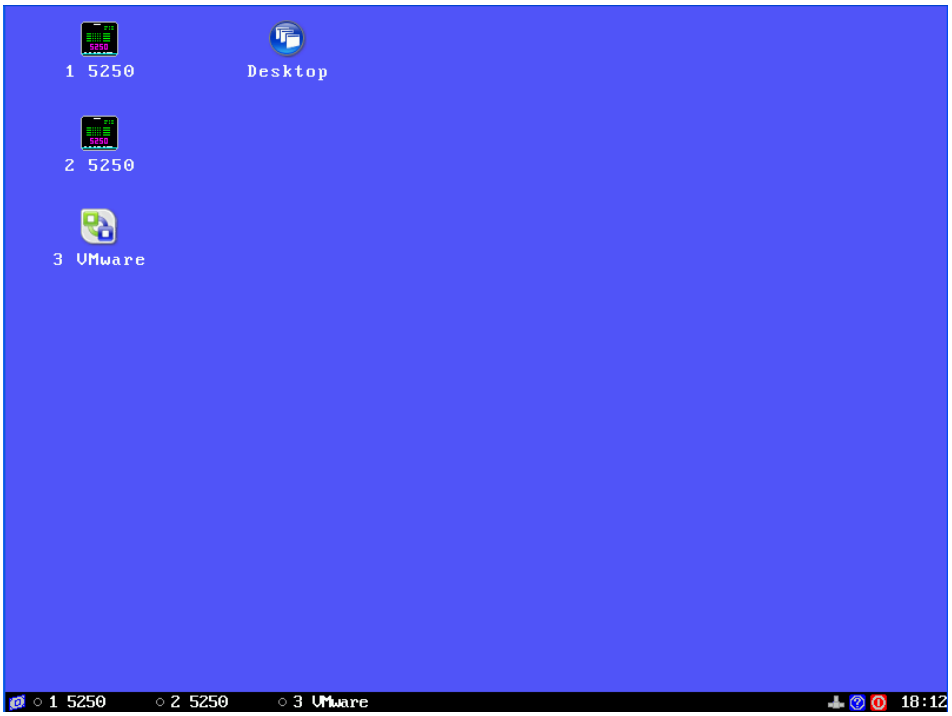
- **Boot**: initialization, network detection...
- **Auto-configuration** (optional): checks over the network if a new firmware/configuration is available. If yes the terminal reboots again for the new firmware/configuration to take effect (for more information see Chapter 2.2)
- **Auto-Connection**: some connections may be opened automatically:
  - Screen sessions (if the 'auto-connection' parameter is set to 'yes'). See Chapter 4.3.
  - Auxiliary port sessions: if the associated service is a client service (tty, telnet or prt5250) and if the 'auto-connection' parameter is set to 'yes'.

  If multiple screen sessions are auto-connected, the first active screen session is displayed.
- **Local Desktop**: if no screen session is connected, the local desktop is displayed (see Chapter 4.2).

4.2 - LOCAL DESKTOP

The local desktop is displayed when there are no current active sessions or if the 'Desktop' icon (in the left of the status bar) had been clicked.

This is the appearance of the local desktop:



The following information is displayed for each predefined session:

- An icon in the desktop area.
- The indicator and the session label in the status bar.

Note 1: the first icon column contains the predefined sessions (from 1 to 6). The optional icon on the second column is the 'Application Desktop' (if enabled).

Note 2: the status bar is always displayed for the local desktop.

Possible actions:

- Click a session icon or press the associated keystroke to open a session. See Table 1.
- Click a status bar icon. See Table 2.

Table 1 - session type icons

Microsoft TSE/RDS Session	Microsoft RemoteApp Desktop	Citrix Receiver Session	Citrix Receiver Desktop	VDI-in-a-Box Session
VMware View Client Session	VNC Session	5250 Session	3270 Session	Text Emulation Session

Table 2 - status bar icons

Coming back the Local Desktop

Turning off - See Chapter 4.5

Getting terminal information (Firmware/Hardware)

The network status is shown by one of the following icons:

- : Wireless interface available
- : Wireless interface not connected
- : Ethernet cable available
- : Ethernet cable not connected

Disconnecting the current session. See Chapter 4.2.5.

USB drive status. Only displayed if a USB drive is attached

- : read in progress
- : write in progress

Set Portrait/Landscape mode - See Appendix A.8.2

Dual Monitor (see Appendix A.6): connection to slave is established

In event of problem:

4.3 - CONNECTING A SESSION

4.3.1 - Creating a Session

Opening a session can be done through:

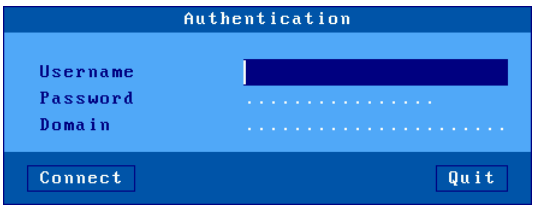
- **The keyboard**: press <Alt><Fx> for a predefined session (see Chapter 3.2.3) or Ctrl><Alt><O> for the application desktop.
- **The mouse**: click onto the session icon or the session label in then status bar.

Note: if the session is 'host free', a dialog box is displayed. The following parameters are required:

- **Connection Type**: read only information.
- **Host**: select if from a list or enter its DNS name or its IP address
- **TCP Port**: the default value is protocol dependent

4.3.2 - Authenticating

When opening a session a local authentication box may be displayed. For example when opening the application desktop or a predefined RDP session configured with a TS Gateway or a TS Broker:



4.3.3 - Checking the SSL Certificate

When an SSL connection is established, the SSL server certificate may be checked. (Only if a CA certificate is installed in the AX3000 Local Store - See Chapter 3.1.5.)

When the server certificate is not valid a dialog box is displayed. For example:

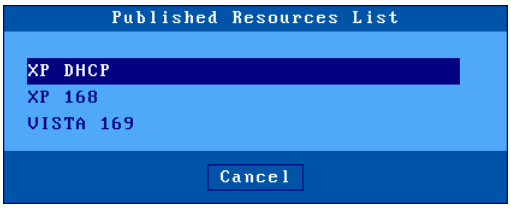
This box lets the user choose to [Abort] or [Continue].

The [Continue] button is available only if the 'Action on Error' option (see Chapter 3.1.5) is set to 'display an alert'. If this option is set to 'refuse the connection', the dialog box looks like the following and the connection is blocked:

In both cases the **[Information]** button displays the SSL server name and additional information about the server certificate.

4.3.4 - Selecting a Resource

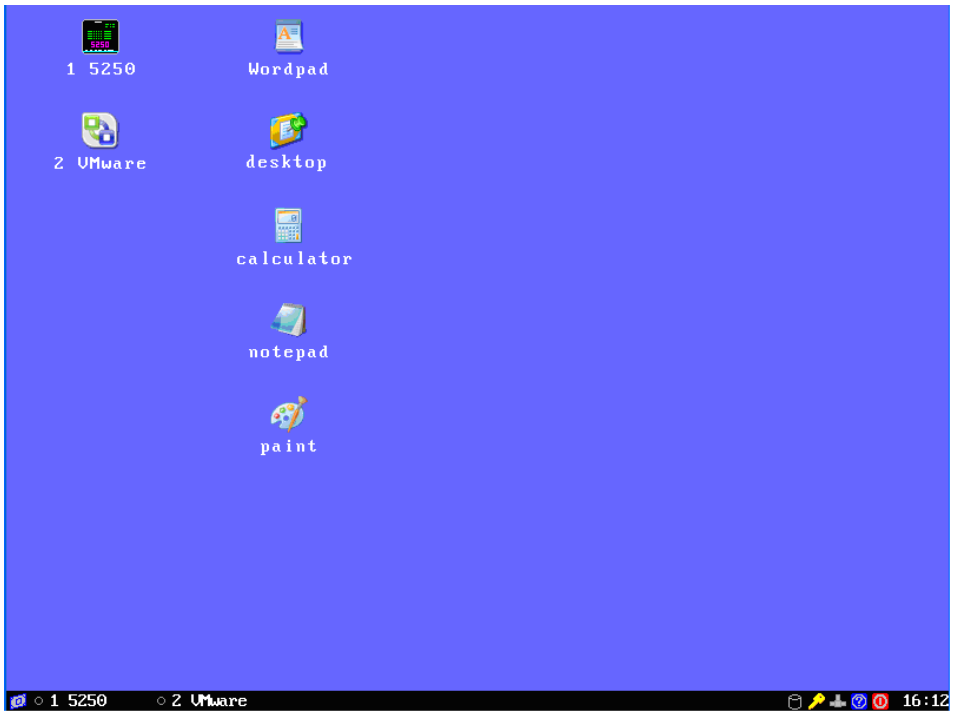
With a predefined 'Citrix Receiver' or 'VMware View Client' session, the user may select the resource to be launched (if no predefined resource had been selected):



When a resource is selected, connection information is requested to the server and an RDP/ICA session is opened.

4.3.5 - Connecting the Application Desktop

After successfully connecting to an Application Desktop the application list and details (name, icons...) are sent to the terminal. The desktop is created locally using this information.



Notes:

- The ‘Folder’ icon is used to organize application icons. In a sub-folder the '..' icon allows to go up to the parent folder.
- The 'Desktop' icon (bottom left) allows the terminal Local Desktop to be redisplayed at any time for launching next published applications.
- <F5> allows information to be refreshed.

When the user clicks on an application icon the terminal uses the first free reserved session to launch an RDP/ICA connection. If all the reserved sessions are already in use the terminal will beep.

General RDP/ICA session information:

- A new RDP/ICA connection becomes the current session.
- The RDP/ICA session uses the general operational parameters specified in the set-up (encoding, bandwidth...).
- The screen resolution and number of colors are issued from the local terminal desktop settings.

To re-launch a published resource, the local desktop must be redisplayed. This can be done by pressing <Alt><Esc> or by clicking the terminal status bar 'desktop' icon (on the left).

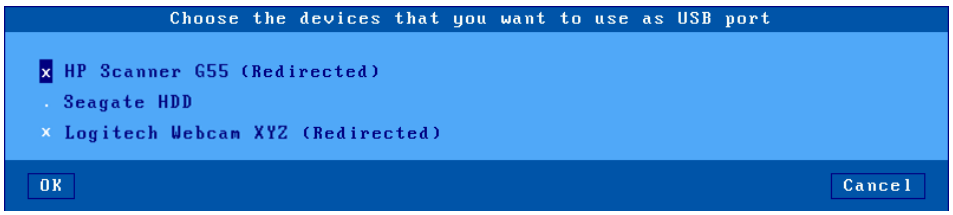
4.3.6 - USB Port Redirection

Note: the USB Port Redirection is only available with an RDP/ICA session connected to a RemoteFX or XenDesktop server.

When the RDP/ICA session is established, the USB redirection is controlled by the 'When the session starts' option (See [Configuration]-[Terminal]-[Global RDP/ICA] menu - See Chapter 3.2.5).

The 'When the session starts' values are:

- Ignore: no eligible device is redirected.
- Connect automatically: all eligible devices are redirected.
- Ask each time: a box showing all eligible devices is displayed. The user can tick (x) or untick (.) a device for starting or stopping the redirection
  For example:


Choose the devices that you want to use as USB port
x HP Scanner G55 (Redirected)
. Seagate HDD
x Logitech Webcam XYZ (Redirected)
OK
Cancel

Note: if the 'While the session is running' option is set, this box is also displayed when a device is plugged during the use of the RDP/ICA session.

4.4 - SWITCHING SESSIONS

AXEL terminals provide **multiple and concurrent connections.** This feature allows simultaneous access to multiple hosts and applications.

Switching sessions can be done through:

- **The keyboard**: press <Alt><Fx> for an existing session or to create a predefined session (see Chapter 3.2.3).
- **The mouse**: click onto the session icon or the session label in then status bar.

If the 'destination' session is not yet active, the connection automatically launches the session. See Chapter 4.3.1.

4.5 - RETURNING TO THE LOCAL DESKTOP

The local desktop is displayed only when there are no current active sessions

Returning to the Local Desktop can be done by pressing <Alt><Esc> or by clicking the terminal status bar 'desktop' icon (on the left).

4.6 - DISCONNECTING SESSION

A session is generally closed by a system command, ie logging out. (This allows session resources to be cleanly released by the server):

- Under Unix/Linux: invoke "exit" command or press <Ctrl><D>.
- Under Windows: select 'Logoff' from the 'Start' Menu.

The session can also be closed in a more brutal way where the session is closed only at the TCP/IP level:

- Click the status bar 'Yellow Key' icon. A confirmation is needed.
- Press **<Ctrl><Alt><D>**. (Immediate close, no confirmation)

On session close, the behavior of the terminal depends on how the '**auto-reconnection**' parameter is set for the current session.

If this parameter is set to '**yes**', a new connection is immediately and automatically established within the current session. See Chapter 4.3.1.

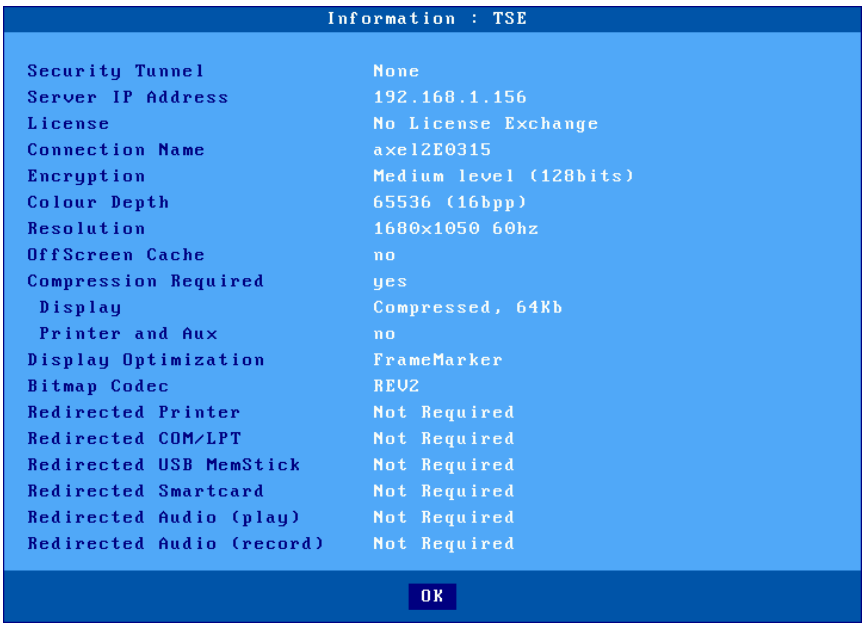
If this parameter is set to '**no**', the AX3000 displays the first of the remaining active sessions. If there are no remaining active sessions (for example, because the last active view has been disconnected), the local desktop is displayed.

4.7 - SPECIAL FEATURES

4.7.1 - Getting Session Information

Press <Ctrl><Alt><i> to get information about current session.

The content of the box depends on the session type. For example from an RDP session:



4.7.2 - Locking the Screen

For security reasons, it might be useful for the AX3000 operator to lock the screen rather than logging out.

Note: the lock screen means the AX3000 screen is blanked but the current sessions are still connected and active. There is no way to enter the AX3000 Set-Up or to switch the session. The only way to regain control is to enter the correct password.

The lock screen feature is associated with the screen saver function and must be enabled through the AX3000 Set-Up (see Chapter 3.2.2).

Two methods are available to lock a screen:

- **Automatically**: when the terminal is idle (keyboard or screen) for a certain time, the AX300 blacks out the monitor display. The display is automatically restored as soon as a key is pressed. A dialog box allowing the screen to be unlocked after password is entered is displayed.
- **Manually**: the <Ctrl><Alt><S> keystroke allows the screen to be locked immediately.

An unlock-screen dialog box is displayed. Two operations are possible:

- Entering the password to unlock the screen. Two passwords can be used: the screen saver password and the set-up password (see Chapter 3.2.8).
- Resetting the AX3000. If the password is forgotten, the only way is selecting the **[Shutdown]** button. After power-cycling it, the AX3000 administrator will be able to modify or remove the screen saver password.

Note: For the highest level of security we recommend setting the terminals 'Set-Up' password. (See Chapter 3.2.8)

4.7.3 - "Copy/Paste" Function

The terminal offers a "Copy/Paste" function which operates either in the current session or between different sessions.

For example, text can be copied from a 5250 session and pasted to a Windows session.

a) Copy

From a Windows Session (RDP or ICA):
Use the standard 'Copy' function. For example <Ctrl><C>

From a VNC Session:
The 'vncconfig' tool must be run. The copy is simply done by selecting a text zone.

From a Text Session (5250, 3270, ANSI, VT...):
Press **<Ctrl><C>** (with 5250 and 3270 emulations) or **<Ctrl><Alt><C>** (with other emulations) to enter the Copy mode. Use the mouse to select the copy

data. Pressing <Enter> validates the selection and the text is copied into a local clipboard. (<Esc> cancels Copy Mode).
Note: the Copy function is available only if the mouse is supported by the current session.

Note: We are unable to use the “standard” of cont c as this is already used for another function within Unix/Linux

b) Paste

To Windows Session (RDP or ICA):
Use the standard 'Paste' function. For example <Ctrl><V>

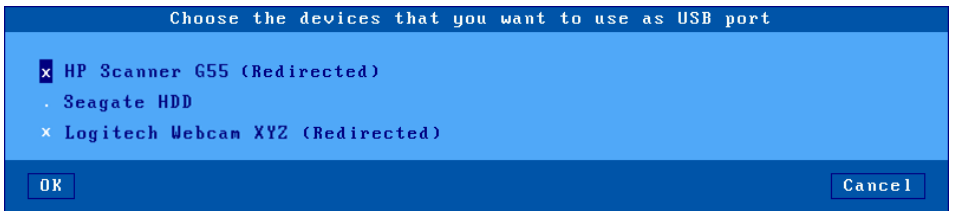
To a VNC Session:
The 'vncconfig' tool must be run. Select 'Paste' in the contextual menu of the Linux software.

To a Text Session (5250, 3270, ANSI, VT, WYSE...):
Press **<Ctrl><V>** (with 5250 and 3270 emulations) or **<Ctrl><Alt><V>** (with other emulations) to paste the contents of the local clipboard.
Note: for the 5250 and 3270 sessions, a <Field Exit> function is sent at the end of each line contained in the clipboard.

4.7.4 – USB Port Redirection Function

Press <Ctrl><Alt><U> to display a dialog box where the USB Port Redirection can be started/stopped per device.

The following shows a typical box:


Choose the devices that you want to use as USB port
x HP Scanner G55 (Redirected)
. Seagate HDD
x Logitech Webcam XYZ (Redirected)
OK
Cancel

Note: this box is only displayed if the USB Port Redirection is enabled within the RDP/ICA session profile.

All eligible devices are listed with the information about the current redirection status. The user can tick (x) or untick (.) a device to start or stop the redirection.

Note: this box may be also displayed when the RDP/ICA session is established (if the 'When the option starts' is set to 'Ask each time'). It also displayed when a USB device is plugged when a RDP/ICA session is in used if the 'While the session is running' option is set to 'Ask each time'. See Chapters 3.2.5 and 4.3.6.

4.8 - TURNING OFF THE AX3000

Care should be taken to avoid powering off the terminal when sessions are active. A server cannot detect if a TCP/IP device is turned-off, so the current TCP/IP connections remain active as far as the server is concerned - resulting in various potential issues.

Under Unix it is advisable not to turn off the TCP/IP AX3000 when a login prompt is displayed (something which is commonly done with serial UNIX terminals). This is because a telnet connection has been opened and will then become an orphan process. The following examples illustrate how the TCP/IP AX3000 differs from a conventional dumb terminal:

- If the 'auto-reconnect' parameter if set to 'yes', a stable stage cannot be reached on the AX3000. New telnet connections will repeatedly be opened.
- Under OS/400, it is impossible to exit the login stage, because there is no way to close the current telnet session.

To allow graceful shutdown, an AX3000 shutdown function is available. Press **<Ctrl><Alt><Del>**.

A dialog box allows the next step to be selected:

- [Shutdown] button
- [Reboot] button

After selection, all active connections (screen and auxiliary port) are closed.

For the "Shutdown" choice, a few seconds later, the user is informed that the

AX3000 may be turned off.

4.9 - AX3000 HOT-KEYS

The AX3000 hot-keys are listed in the following table. (These hot-keys are locally processed by the AX3000 and independent of emulation).

PC-Keyboard	5250-Keyboard	Action
<Ctrl><Alt><Esc>	<Rest><Alt><Esc>	Enters the AX3000 Set-Up
<Alt><Fx>	<Alt><Fx>	Switches session
<Alt><Esc>	---	Goes to terminal desktop
<Alt><+>	<Alt><+>	Goes to next session
<Alt><->	<Alt><->	Goes to previous session
<Ctrl><Alt><S>	**<Rest><Alt><S>**	Locks the screen.
<Ctrl><Alt><Pause>	<Rest><Alt><Pause>	Sends a break code. **Note**: only for telnet.
<Ctrl><Alt><Prt Scr>	<Rest><Alt><Prt Scr>	Performs a screen dump to the default auxiliary port.
<Ctrl><Alt><D>	**<Rest><Alt><D>**	Closes the current session
<Ctrl><Alt><K>	**<Rest><Alt><K>**	Changes the keyboard type (PC√AS/400)
<Ctrl><Alt><Del>	**<Rest><Alt><Del>**	Shuts down the AX3000.
<Ctrl><Alt><i>	---	Information about the current session.
<Ctrl><Alt><X>	**<Rest><Alt><X>**	Opens the connection box (see Chapter 9.2)
<Ctrl><Alt><BackTab>	<Rest><Alt><BackTab>	Back to 800x600.
<Ctrl><C> or <Ctrl><Alt><C>	<Rest><C>	Selects and copies a screen zone (mouse is requested)
<Ctrl><V> or <Ctrl><Alt><V>	<Rest><V>	Paste the text
<Ctrl><Alt><U>	---	USB Port Redirection

Note: keystrokes written in bold can be disabled. See Chapter A.8.2, section d).

- 5 -
INSTALLING UNDER WINDOWS

This chapter covers AX3000 installation under Windows

This chapter describes the operation of the AX3000 in a Windows environment. For more general information please refer to the previous chapters.

The connection to a Windows server can be done either via:

- **Individual session**: this is a dedicated connection to a server, a broker or a farm of servers. The target resource can be either an application or a desktop.
  This is for Microsoft TSE/RDS, Citrix Receiver or VMware View Client.
- **Application Desktop**. This feature allows a user, after authentication, to see the icons of his published application on the terminal's desktop. Launching a published application is simply done by clicking the associated icon. To open the application an RDP or ICA session is automatically established
  This is for Microsoft RemoteApp (server 2008R2 or more) and Citrix Receiver.

The next chapters are:

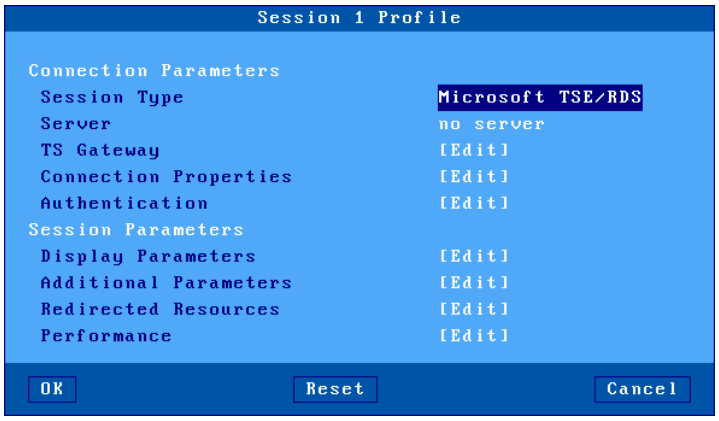
- Microsoft TSE/RDS Session. See Chapter 5.1.
- Citrix Receiver Session. See Chapter 5.2.
- Application Desktop: Citrix Receiver and RemoteApp. See Chapter 5.3.
- VMware View Client Session. See Chapter 5.4.

5.1 - MICROSOFT TSE/RDS SESSION

Axel terminals provide an embedded RDP-compatible protocol. The following table shows key features available for each operating system:

	Number of colors (bits/pixel)	Redirection		
		Printer	COM Port	Audio
NT4-TSE	8 bpp	-	-	-
Windows 2000	8 bpp	Yes	-	-
Windows 2003	8 bpp, 15 bpp, 16 bpp and 24 bpp	Yes	Yes	Play
Windows 2008 Windows 2012	8 bpp, 16 bpp and 32 bpp	Yes	Yes	Play Record

To set a Microsoft TSE/RDS session, enter the AX3000 Set-Up, select the **[Configuration]-[Sessions]-[Session X]** menu (where X is the session number to be configured), then select the "Microsoft TSE/RDS" Session Type. The following box is displayed:



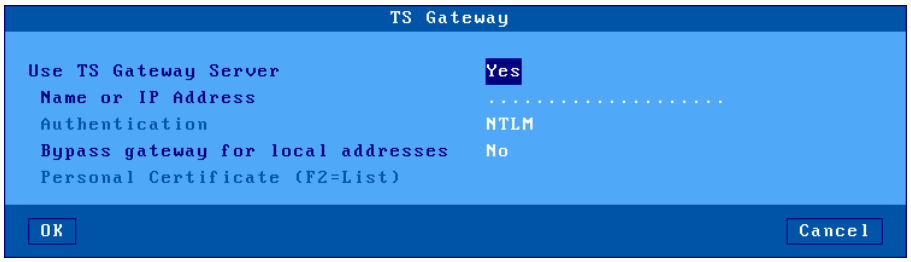
Set the following parameters:

- **Server**: selected from the server table (see Chapter 3.1.4). A new server can be added by selecting 'IP address' or 'Server Name'.
- **TS Gateway**: a dialog box which lets RDS gateway parameters be changed. See Chapter 5.1.1.
- **Connection Properties**: See Chapter 5.1.2.

- **Authentication**: set the "Automatic Logon" function and/or the "Auto-Run" function. See Chapter 5.1.3.
- **Display Parameters**: see Chapter 5.1.2.
- **Additional Parameters**: a dialog box, which lets certain RDP parameters be changed. See Chapter 5.1.3.
- **Redirected Resources**: see Chapter 5.1.5.
- **Performances**: a dialog box, which lets certain parameters be changed. See Chapter 5.1.6.

5.1.1 - TS Gateway

The following box is displayed:



The option "Use TS Gateway Server" allows the name or the IP address of the RDS gateway server to be entered.

Note: Authentication is always NTLM.

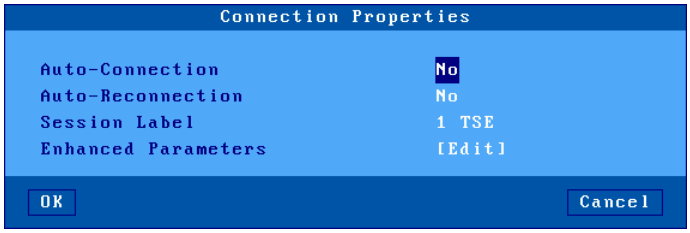
Bypass Gateway for Local Addresses: with this option, a direct connection is first opened to the TSE server. In event of failure, a second connection attempt is made to via gateway.

Personal Certificate: with the HTTPS connection, a personal certificate may be requested by the server. This option allows a personal certificate to be predefined to avoid a manual selection by the user.

Note: this option is disabled if the AX3000 Local Store contains no personal certificate. See Chapter 3.4.7.

5.1.2 - Connection Properties

The following box is displayed:

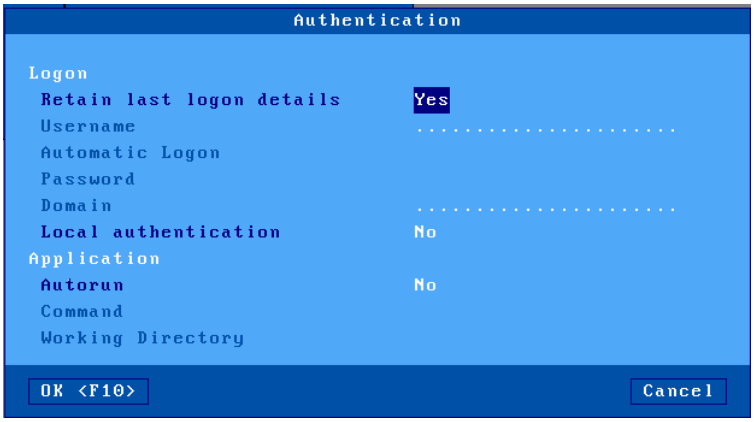


These parameters are:

- **Auto-Connection**: if this parameter is set to 'yes', the connection will be automatically established when the AX3000 is powered. Otherwise, the user can press <Alt><Fx> to establish the connection.
- **Auto-Reconnection**: if this parameter is set to 'yes', a new connection is automatically established after a disconnection. Otherwise, the user can press <Alt><Fx> to establish a new connection.
- **Session Label**: this character string (11 characters max.) is used to identify the session within the local desktop or in the status bar.
- **Enhanced parameters**: see Appendix A.8.3.

5.1.3 - Authentication

The following box is displayed:



These parameters are:

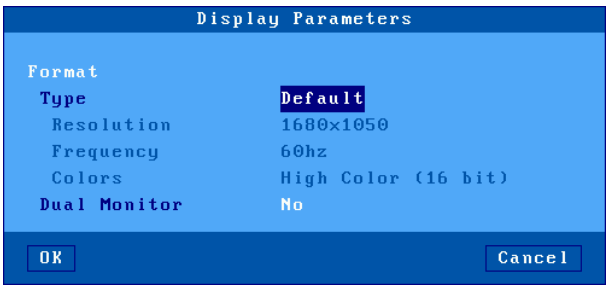
- **Retain last logon details:** this parameter allows the username and domain fields of the Login screen to be automatically set-up.
- **Username**: default value for the username field of the Login screen.
- **Automatic Logon**: set this parameter to 'Yes' to get an automatic logon.
- **Password**: available only if 'Automatic Logon' is set to 'Yes'.
- **Domain**: default value for the Windows domain field of the Login screen.
- **Local Authentication**: enabling this parameter allows authentication information to be entered before the RDP connection is established. This can be useful with a 'Connection broker'. The authentication can be either a username or a pin code (if smartcard redirection is enabled). The possible values for this parameter are: "no", "yes" (username or pin code) or "Yes, Smartcard Only".
- **Auto Run**: by default the Terminal Services connection offers a Windows desktop. To automatically launch a program set this parameter to 'Yes' and complete the following fields.
- **Command** (available only if 'Auto-Run' is set to 'yes'): the program path and file name of the program to be launched.
  Example: `%SystemRoot%\system32\cmd.exe`
- **Working Directory** (available only if 'Auto-Run' is set to 'yes'): sets program working directory.

Example: `D:\`

Note: this 'auto-run' feature can allow application to be published by the Axel Menu software. See Chapter 5.6.

5.1.4 - Display Parameters

The following box is displayed:



This box allows display settings (resolution, number of colors and frequency) to be set. The availability of these parameters depends of the **Type** value:

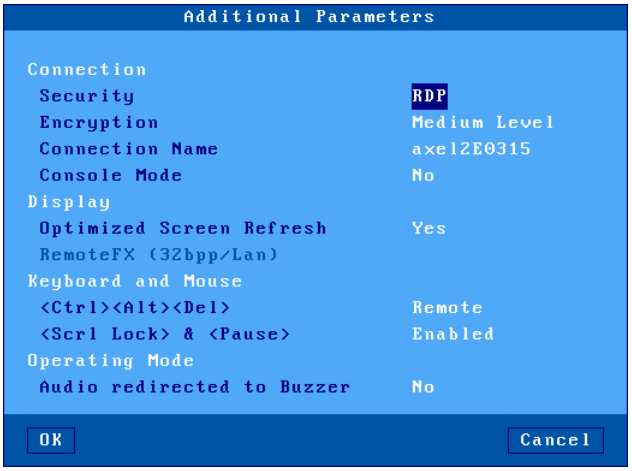
- **Default**: these three parameters are issued from general settings (see Chapter 3.2.2). When general settings are modified, these three parameters are automatically updated with new values.
- **Customized**: the three parameters are independent from general settings.

The '**Dual Monitor**' option allows this mode to be set-up for this session. For more information, please refer to Chapter 3.2.2 and Appendix A.6.

Note: the '**Dual Monitor**' option is disabled when a TS Gateway is used.

5.1.5 - Additional Parameters

The following box is displayed:



These parameters are:

- **Security**: values are:
  - RDP: the terminal offers standard RDP security layer. If this is denied by the server, the SSL/TLS or SSL/TLS+NLA security layer is offered.
  - SSL/TLS: the terminal offers both the traditional and the SSL/TLS security layers.
  - SSL/TLS+NLA: the terminal offers both the traditional and the SSL/TLS+NLA security layers.
- **Encryption**: encryption levels are:
  - No: only non-encrypted connections are accepted.
  - Low Level: only one-direction encrypted connections are accepted. (Data sent by Windows is encrypted).
  - Medium Level: both-direction and one-direction encrypted connections are accepted.
  - High Level: only both-direction encrypted connections are accepted.

- **Connection Name**: this character string identifies the AX3000 within the Windows Operating System. By default this name is the terminal name (see Chapter 3.1.1).
- **Console Mode:** when set to 'yes', the RDP connection will take remote control of the Windows Server main console.
- **Optimized Screen Refresh**: smooth video playback especially for flash type content (ie Youtube).
- **RemoteFX (32bpp/LAN)**: this operating mode available only for a 32bbp connection with the 'Network Speed' sets to 'LAN'.
- **<Ctrl><Alt><Del>**: the two modes for this keystroke are:
    - Local: the keystroke is handled by the AX3000 and is used for shutdown the terminal (see Chapter 4.8)
    - Remote: the keystroke is handled by the Windows server (for example opening the task manager).
- **<Scroll Lock> & <Pause>:** enable or disable these two keys
- **Audio Redirected to Buzzer:** this mode allows system beep to be sounded by a terminal with no audio USB device.

5.1.6 - Redirected Resources

The redirected resources mechanism allows one or more locally attached peripherals to be 'published' to the Windows server. These resources are available only for the terminal's user. They are created on the Windows server when the connection is established and removed when the session is disconnected.

The following local resources are supported:

- **Printers**: before being redirected each printer must be declared at the 'physical connection port' level. See first sub-section a) then c).
- **Mass storage devices**: see sub-section c).
- **Smartcard readers**: see sub-section c)
- **Audio**: see sub-section c)
- **COM/LPT ports** before being redirected each port must be declared at the physical port level. See first sub-section b) then c).
- **USB ports**: a set of eligible USB devices must be first defined (see Chapter 3.2.5). Then see sub-section c)

Note about minimum server versions:

- Printer redirection: Windows 2000 server

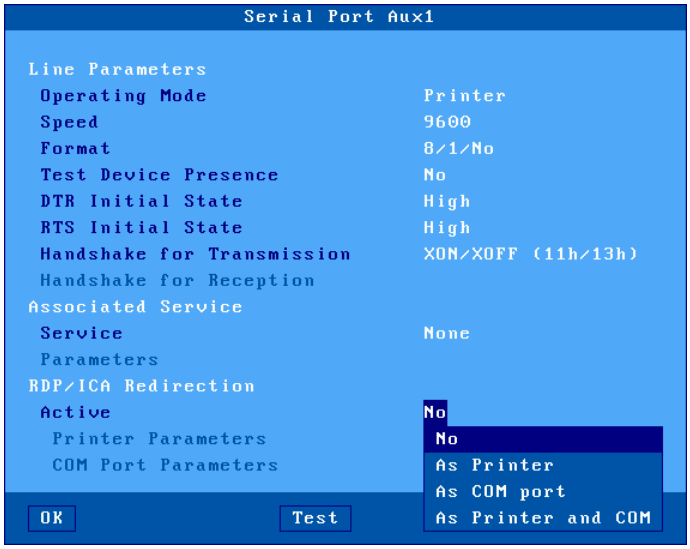
- USB port redirection: Windows 2012 server (or Windows 8).
- For other resources, a Windows 2003 server is required (except for Audio where a Windows 2008 server is strongly advised).

a) Declaring a Redirected Printer

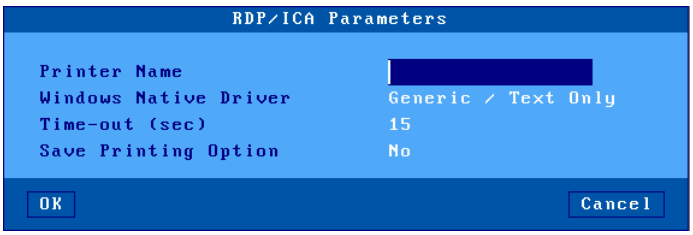
At the RDP/ICA connection time a redirected printer will be automatically added to the Windows spooler. It will be removed when the session disconnects.

Before being redirected an RDP/ICA printer must be declared at the 'physical connection port' level. The available ports are: auxiliary ports (parallel, Aux1 and Aux2), USB logical ports and network printers.

Select the dialog box of the 'Printer port' (menu **[Configuration]-[Ports]-[xxx]**). For example, the Aux1 port:



Set the 'Active' parameter to 'As Printer' or 'As Printer and COM'. Then select 'Printer Parameters'. The following box is displayed:



These parameters are:

- **Printer Name**: name of the Windows printer
- **Windows Native Driver**: printer driver name. It is ESSENTIAL that the value entered here matches the printer driver name exactly as installed on the server. If the match is not exact Windows will not be able to connect the printer to the driver and the printer will not be added to the Windows spooler.
- **Time-out (sec)**: in event of a printer error (no paper, off-line, etc.), this is the delay before the terminal reports the error to Windows.
- **Save Printing Option**: when the default printer configuration is modified (on the server side), this option allows the terminal to store this configuration (in the AX3000 Local Store). See Chapter 3.4.7.

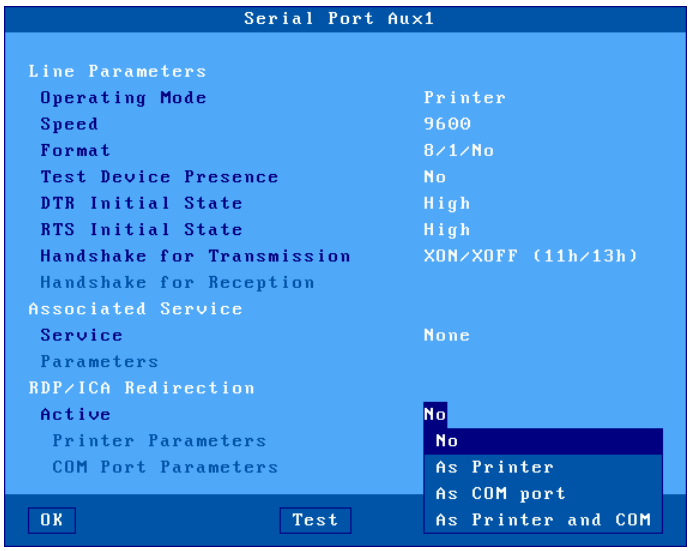
The printer declaration is completed. For the redirection procedure, consult the sub-section c).

b) Declaring a Redirected COM/LPT Port

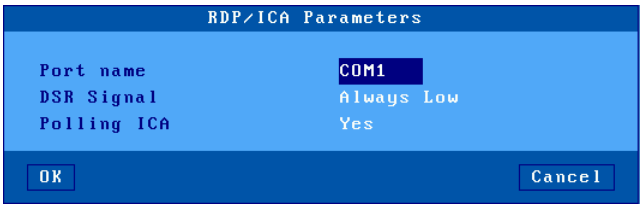
On an RDP/ICA connection a redirected COM/LPT port will be automatically added to the Windows server resources. It will be removed on disconnection. Maximum two ports can be redirected.

Before being redirected an RDP/ICA COM Port must be declared at the 'physical port' level. The available ports are: auxiliary ports (parallel, Aux1 and Aux2) and USB logical ports.

Select the dialog box of the 'COM port' (menu **[Configuration]-[Ports]-[xxx]**). For example, the Aux1 port:



Set the 'Active' parameter to 'As COM port' or 'As Printer and COM'. Then select 'COM Port Parameters'. The following box is displayed:



These parameters are:

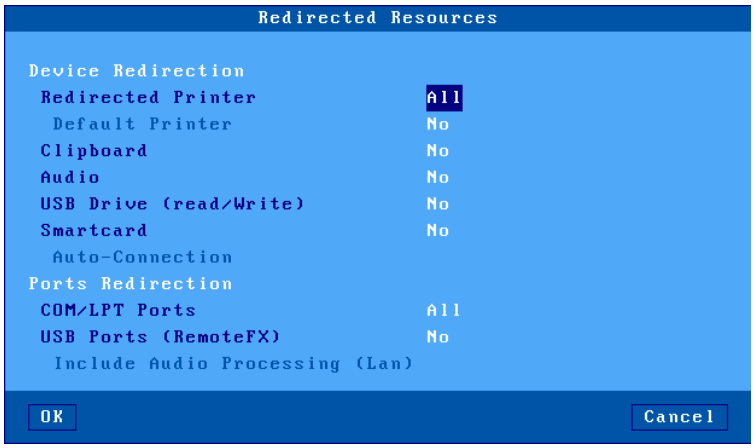
- **Port Name**: redirect COM port name (from COM1 to COM255).
- **DSR Signal** (only for Aux1 and Aux2): the DSR signal is not supported by the AX3000 native auxiliary ports. This parameter allows the incoming DSR value to be emulated. The possible values are: "Always Low", "Always Up", "Follows CTS" or "Follows CD".
- **Polling ICA**: not applicable

Note: for redirecting an LPT port, set the 'Active' parameter to 'As LPT port' or 'As Printer and LPT. The LPT port settings dialog box only offers to customize the LPT name (LPT1 by default).

The COM port declaration is completed. For the redirection procedure, consult the next sub-section.

c) Redirecting Resources within the RDP session

To redirect resources within a session select the session profile box (menu **[Configuration]-[Sessions]-[Session X]**). Within this box, select 'Redirected Resources'. The following box is displayed:



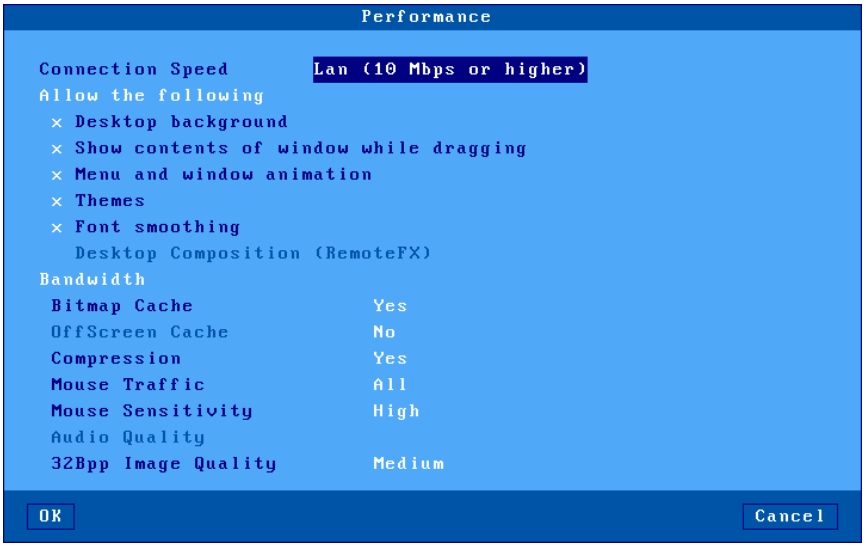
These parameters are:

- **Redirected Printer**: printer(s) are selected through a list. This list is composed by the following items:
  - **All**
  - **None**
  - ***Printer Name (port)***: these are the RDP/ICA printer name(s). This allows the selection of only one printer to be redirected.
- **Default printer**: set (or not) a printer as the default printer.
- **Clipboard**: enable/disable 'copy and paste'.

- **Audio**: set (or not) the 'classic' audio redirection ('play' or 'play and record'). The audio quality (and the amount of audio data) can be customized in the bandwidth option. See next chapter.
- **USB Drive**: set (or not) the mass storage device redirection. The 'Access Permission' value reminds the selected mode (see Appendix A.8.2).
- **Smartcards**: set (or not) the smartcard redirection.
- **Auto-Connection**: when set to yes, the option allows the ICA session to be automatically established when a smartcard is inserted in the reader.
- **Redirected COM/LPT Port**: COM port(s) are selected through a list. This list is composed by the following items:
    - **All**
    - **None**
    - ***xxx (port)***: these are the COM/LPT port name(s). This allows the selection of only one port to be redirected.
- **USB Ports (Remote FX)**: set (or not) the USB Port Redirection (server 2012 or Windows 8 is required). For more information about 'Eligible Devices' see Chapter 3.2.5.
- **Include Audio Processing (Lan)**: this options allows the audio to be handled by the USB Port Redirection. And no more by the 'classic' redirection (see above). This is only permitted for a session with the 'Network Speed' sets to 'LAN' (See next chapter).

5.1.7 - Performance

The following box is displayed:



The first option allows the 'Connection Speed' to be set. This value will be used by default some User Experience options. All these features can be enabled/disabled. To enable a feature set to "x":

- **Desktop Background**: the AX3000 operator is allowed to select a desktop background.
  Note: the background option must be also allowed by the Windows server.
- **Show contents of window while dragging**: the AX3000 operator can choose to display the contents of windows while resizing or dragging.
- **Menu and window animation**: the AX3000 operator is allowed to select the animation function.
- **Themes**: the AX3000 operator is allowed to select a theme (i.e. a desktop appearance) other than the Windows Classic Theme.
- **Font Smoothing**.
- **Desktop Composition (RemoteFX)** (only available with RemoteFX - See Chapter 5.1.5): allows a full aero experience (translucent windows, flip 3D, preview in the taskbar…).

Note: above options are only supported when connecting to a Windows 2003 server (or higher)

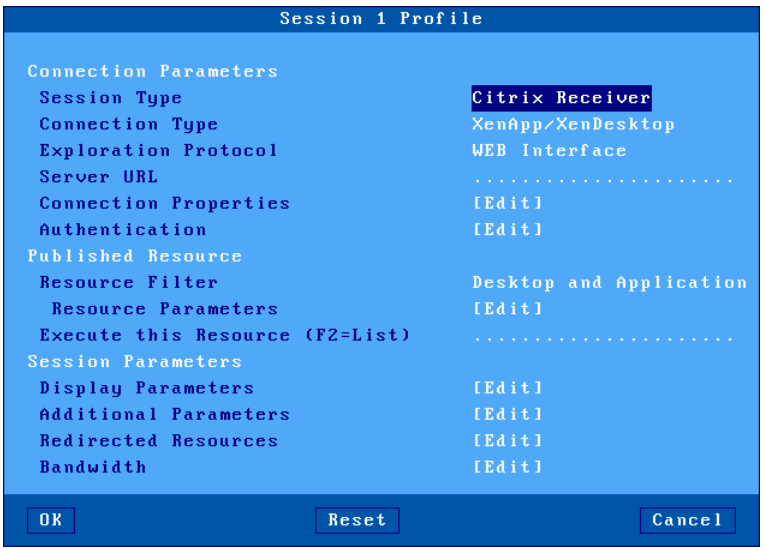
The 'Bandwidth' parameters are:

- **Bitmap Cache**: enabling the bitmap cache allows the AX3000 to store images (icon, buttons, etc) locally. This can both improve the AX3000 performance and decrease network traffic. Three values:
  - No: no cache
  - Yes: the cache is reset each time a new session is established
  - Yes, persistent: the cache is not reset when a session is closed. This could allow bandwidth to be saved for the next session.
- **Offscreen Cache** (available only if "Optimized Screen Refresh" is disabled - See Chapter 5.1.5): enabling the offscreen cache allows the AX3000 to store images in a 'non visible' part of the VGA memory. This parameter can be enabled for a single session. This can both improve the AX3000 performance and decrease network traffic.
- **Compress**: this allows Windows to send compressed data. Possible values are: 'no', 'rdp 5.2', 'rdp 6.0', 'yes'. This last value allows all the supported compression types (rdp 5.2, rdp 6.0 and rdp 6.1) to be advertised.
- **Mouse Traffic**: the options are:
  - All (default): all mouse events (clicks and position) are sent to the server.
  - Click: only the click events are sent to the server. This reduces the data flow. But the mouse cursor is not updated in real time. This mode can significantly reduce bandwidth.
- **Mouse Sensitivity**: This setting varies the sample rate of the mouse. If the sensitivity is increased the mouse movement will be more fluid, but also network activity is increased as the sample rate is increased.
- **Audio Quality**: the bandwidth depends on the audio quality. For remote connections prefer a low quality.
- **32bpp Image Quality**: with the 'medium' and 'high' quality, NScodec will be used (this will reduce significantly the bandwith). With the 'Maximum' a legacy codec is used.

5.2 - CITRIX RECEIVER SESSION

The "Axel ICA-compliant" protocol allows Axel terminals to be connected to Metaframe XP, Presentation server 4, Presentation server 4.5, XenApp, XenDesktop and VDI-in-a-Box.

To set the Citrix Receiver session, enter the AX3000 Set-Up and select the **[Configuration]-[Sessions]-[Session X]** menu (where X is the session number to be configured). The following box is displayed:



The three sections of this box (Connection Parameters, Published Resource and Session Parameters) are described in the next chapters.

5.2.1 - 'Connection Parameters' Section

An ICA session is associated with one of the following **connection types**:

- **XenApp/XenDesktop**: the published resources are managed via the 'WEB Interface' or 'TCP/IP + HTTP' exploration protocols.
- **MetaFrame**: the published resources are managed via the 'WEB Interface', 'TCP/IP + HTTP' or 'TCP/IP' exploration protocols.

- **VDI-in-a-Box**: the published desktops are managed via the 'WEB Interface' exploration protocol.
- **Direct Access**: connection to a server (DNS Name or IP address).

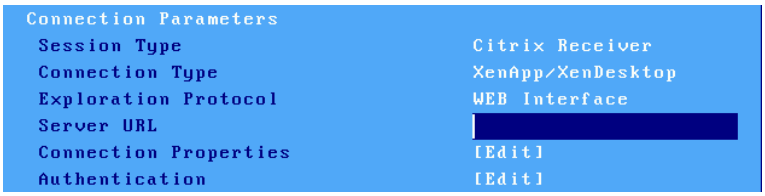
The following deal with the 3 exploration protocols and the Direct Access. Other options are described later:

- **Connection Properties**: see Chapter 5.2.4.
- **Authentication**: see Chapter 5.2.5.

a) WEB Interface Protocol

At the Citrix farm level, a 'PNAgent site' must be added to the WEB Interface server. The resource management (enumerating / launching) is controlled by an authentication process.

This is a part of the dialog box:



Server URL: syntax is [https://]server[:port][/config].

- **https**: optional use (default: http)
- **server**: DNS name of IP address of WEB Interface server
- **port**: optional TCP port (default: 80 for http and 443 for https)
- **/config**: optional configuration full pathname (default is "/Citrix/PNAgent/config.xml")

b) TCP/IP+HTTP Protocol

Resources are accessed via one of the farm server (Name/IP and XML port). A local authentication may be used to filter out user's resources.

This is a part of the dialog box:

Server and XML Port: DNS name or IP address optionally followed by the XML port (use ':' as separator)
Example: 192.168.1.154:8080

Note: the Citrix XML port value can be obtained in the Citrix Console or in the Windows registry: [HKLM]-[System]-[Current Control Set]-[Services]-[Ctxhttp]-[TCPPort].

c) TCP/IP Protocol

Actually this is a UDP protocol working either in broadcast or unicast modes.

This is a part of the dialog box:

Server: DNS name or IP address optionally followed by the UDP port (use ':' as separator). Default UDP port is 1604. If the field is left blank, the broadcast mode is used.

d) Direct Access

This mode allows a Citrix connection to be established without the use of a published resource.

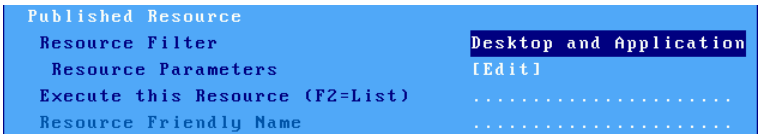
This is a part of the dialog box:

Server: selected from the server table (see Chapter 3.1.4). A new server can be added by selecting 'IP address' or 'Server Name'.

5.2.2 - 'Published Resource' Section

A Published Resource can be a Desktop, an Application or a Citrix Server.

This is a part of the dialog box:



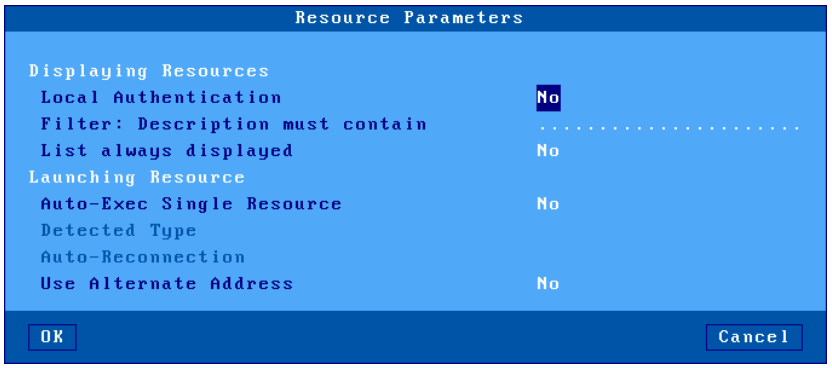
Note: the 'Published Resource' section is not available for a 'Direct Access' type.

Resource Filter: according to the connection and session types, different filter values are available:

- **Desktop and Application**: available with 'WEB Interface', 'TCP/IP + HTTP' or 'TCP/IP' exploration protocols.
- **Desktop only**: available with 'WEB Interface', 'TCP/IP + HTTP' exploration protocols and 'VDI-in-a-Box' Connection Type.
- **Application only**: available with 'WEB Interface', 'TCP/IP + HTTP' exploration protocols.
- **Servers**: available with ''TCP/IP + HTTP' or 'TCP/IP' exploration protocols.

Execute this Resource: the specified resource will be launched when the Citrix session will be opened. If this field is left blank, a list will be displayed. The resource name can be manually entered or picked up from a list (press <F2>).

The 'Resource Parameters' box drives the way how resources are listed:



Displaying Resources: these options are used for enumerating resources:

- **Local Authentication**: the benefit of authentication is enumerating resources associated with a user account (ie not all the resources of the Citrix farm). This authentication is mandatory with 'WEB Interface' protocol, optional with 'TCP/IP + HTTP' protocol and not available with 'TCP/IP' protocol.
  For more information please see the Citrix Manual.
- **Filter: Description must contain**: this allows displaying only published resources with a description field including the entered character string.
- **List always displayed**: However a resource is predefined, this allows the resource list to be displayed (the selected resource is the default one).

Launching Resource: these options are used for launching the resource:

- **Auto-Exec Single Resource:** if only one resource is published, this option runs it automatically.
- **Detected Type** (only with local authentication): this parameter, also known as "smooth roaming", allows a user to retrieve his former sessions from another workstation. The types can be "**disconnected**" or "**disconnected and active**". If a former connection is retrieved, the 'Auto-Reconnection' option allows it to be run.
- **Use Alternate Address** (only for Citrix TCP/IP +HTTP): set it to 'Yes' when a firewall is present. See CTX039746 in Citrix Knowledge Base

5.2.3 - 'Session Parameters' Section

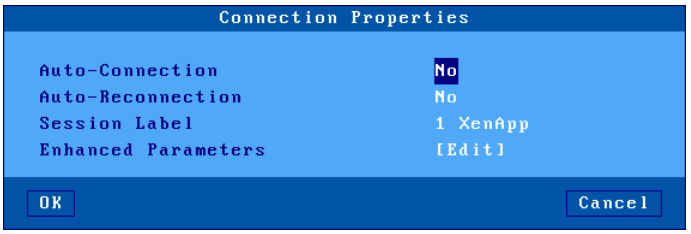
This is a part of the dialog box:

Set the following parameters:

- **Display Parameters**: display settings (resolution and colors). See Chapter 5.2.6.
- **Additional Parameters**: a dialog box, which lets certain ICA parameters be changed. See Chapter 5.2.7.
- **Redirected Resources**: set redirected resources (printers, COM ports, etc.). See Chapter 5.2.8.
- **Bandwidth**: a dialog box which lets certain parameters be changed. See Chapter 5.2.9.

5.2.4 - Connection Properties

The following box is displayed:



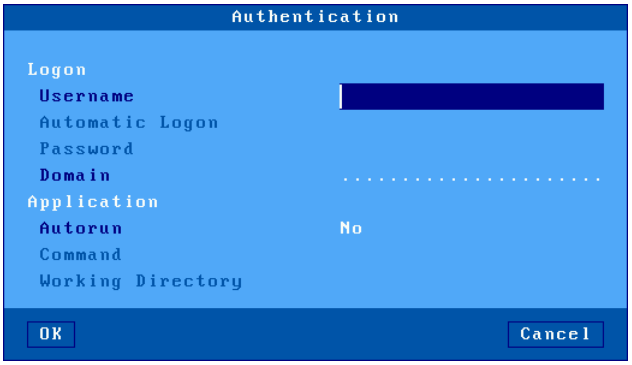
These parameters are:

- **Auto-Connection**: if this parameter is set to 'yes', the connection will be automatically established when the AX3000 is powered. Otherwise, the user can press <Alt><Fx> to establish the connection.
- **Auto-Reconnection**: if this parameter is set to 'yes', a new connection is automatically established after a disconnection. Otherwise, the user can press <Alt><Fx> to establish a new connection.

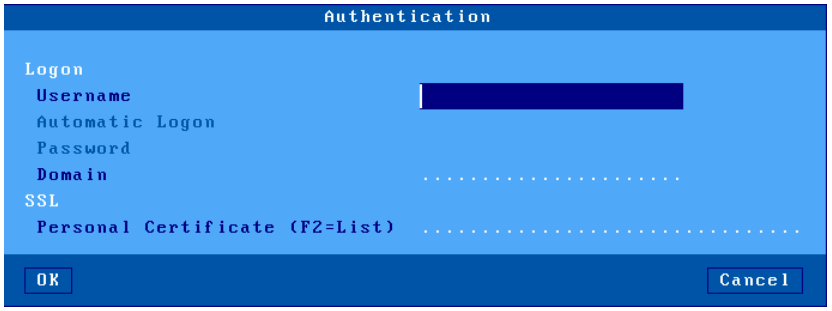
- **Session Label**: this character string (11 characters max.) is used to identify the session within the local desktop or in the status bar.
- **Enhanced parameters**: see Appendix A.8.3.

5.2.5 - Authentication

The dialog box depends on the Connection Type:



Direct Access



Other Connection Type

The "Logon" section parameters are:

- **Username**: default value for the username field of the logon screen.
- **Automatic Logon**: set this parameter to 'Yes' to get an automatic logon.
- **Password**: available only if 'Automatic Logon' is set to 'Yes'.
- **Domain**: default value for the Windows domain field of the logon screen.

The "Application" section parameters (only for Direct Access) are:

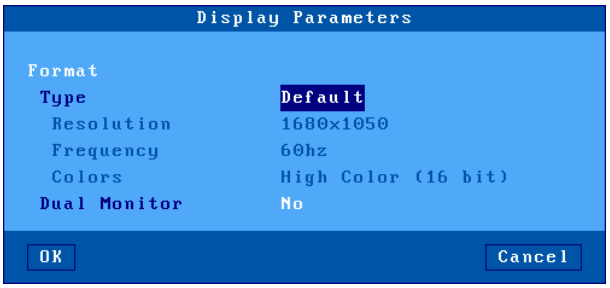
- **Auto-Run**: by default the Terminal Services connection offers a Windows desktop. To automatically launch a program set this parameter to 'Yes' and complete the following fields.
- **Command** (available only if 'Auto-Run' is set to 'yes'): the program path and file name of the program to be launched.
  Example: `%SystemRoot%\system32\cmd.exe`
- **Working Directory** (available only if 'Auto-Run' is set to 'yes'): program working directory.
  Example: `D:\`

The "SSL" section parameters (all Connection Types except Direct Access) are:

- **Personal Certificate**: in event of SSL connection, a personal certificate may be requested by the server. This option allows a personal certificate to be predefined to avoid a manual selection by the terminal user.
  Note: this option is disabled if the AX3000 Local Store doesn't contain a certificate.

5.2.6 - Display Parameters

The following box is displayed:



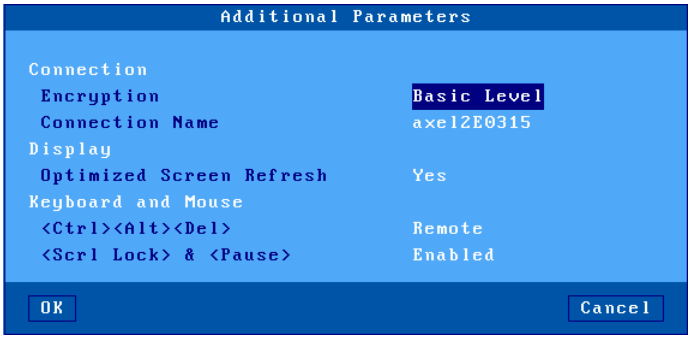
This box allows display settings (resolution, number of colors and frequency) to be set. The availability of these parameters depends of the **Type** value:

- **Default**: these three parameters are issued from general settings (see Chapter 3.2.2). When general settings are modified, these three parameters are automatically updated with new values.
- **Customized**: the three parameters are independent from general settings.

The '**Dual Monitor**' option allows this mode to be set-up for this session. For more information, please refer to Chapter 3.2.2 and Appendix A.6.

5.2.7 - ICA Additional Parameters

The following box is displayed:



These parameters are:

- **Encryption**: the supported encryption protocols are:
  - Basic Level: default encryption protocol of Metaframe.
  - RC5: strongest encryption protocol (with different key lengths)
- **Connection Name**: this character string identifies the AX3000 within the Windows Operating System (see CLIENTNAME environment variable). The default value is the terminal name (see Chapter 3.1.1).
- **Optimized Screen Refresh**: smooth video playback especially for flash type content (ie Youtube).
- **<Ctrl><Alt><Del>**: the two modes for this keystroke are:
  - Local: the keystroke is handled by the AX3000 and is used for shutdown the terminal (see Chapter 4.8)
  - Remote: the keystroke is handled by the Windows server (for example opening the task manager).
- **<Scroll Lock> & <Pause>:** enable or disable these two keys

5.2.8 - Redirected Resources

The redirected resources mechanism allows one or more local resources to be 'published' to the Windows server. These resources are available only for the terminal's user. They are created on the Windows server when the connection

is established and removed when the session is disconnected.

The following local resources are supported:

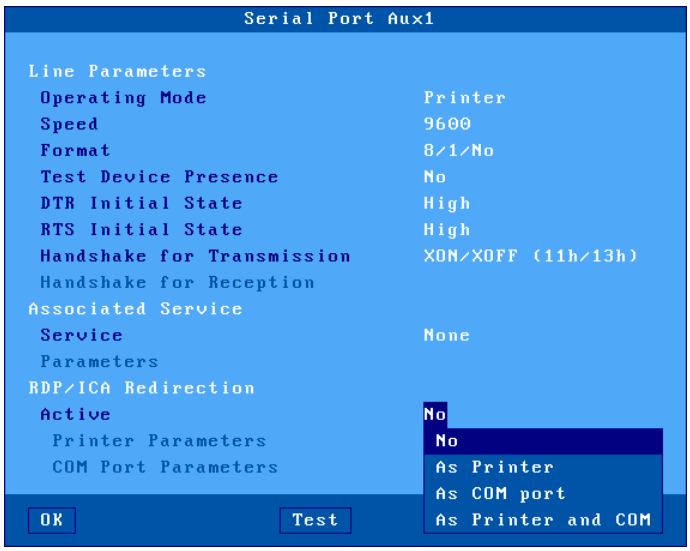
- **Printers**: before being redirected each printer must be declared at the 'physical connection port' level. See first sub-section a) then c).
- **COM/LPT ports** before being redirected each port must be declared at the physical port level. See first sub-section b) then c) and d).
- **Mass storage devices**: see sub-section c).
- **Smartcard readers**: see sub-section c)
- **Audio**: see sub-section c)

a) Declaring a Redirected Printer

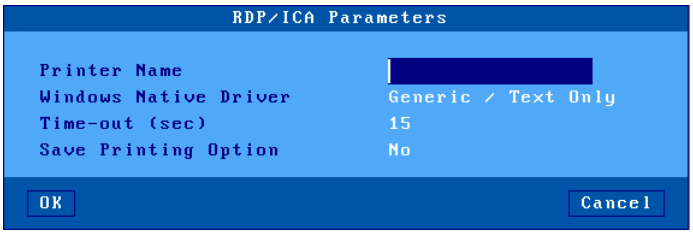
At the RDP/ICA connection time a redirected printer will be automatically added to the Windows spooler. It will be removed when the session disconnects.

Before being redirected an RDP/ICA printer must be declared at the 'physical connection port' level. The available ports are: auxiliary ports (parallel, Aux1 and Aux2), USB logical ports and network printers.

Select the dialog box of the 'Printer port' (menu **[Configuration]-[Ports]-[xxx]**). For example, the Aux1 port:



Set the 'Active' parameter to 'As Printer' or 'As Printer and COM'. Then select 'Printer Parameters'. The following box is displayed:



These parameters are:

- **Printer Name**: name of the Windows printer
- **Windows Native Driver**: printer driver name. It is ESSENTIAL that the value entered here matches the printer driver name exactly as installed on the server. If the match is not exact Windows will not be able to connect the printer to the driver and the printer will not be added to the Windows spooler.

- **Time-out (sec)**: in event of a printer error (no paper, off-line, etc.), this is the delay before the terminal reports the error to Windows.
- **Save Printing Option**: when the default printer configuration is modified (on the server side), this option allows the terminal to store this configuration (in the AX3000 Local Store). See Chapter 3.4.7.

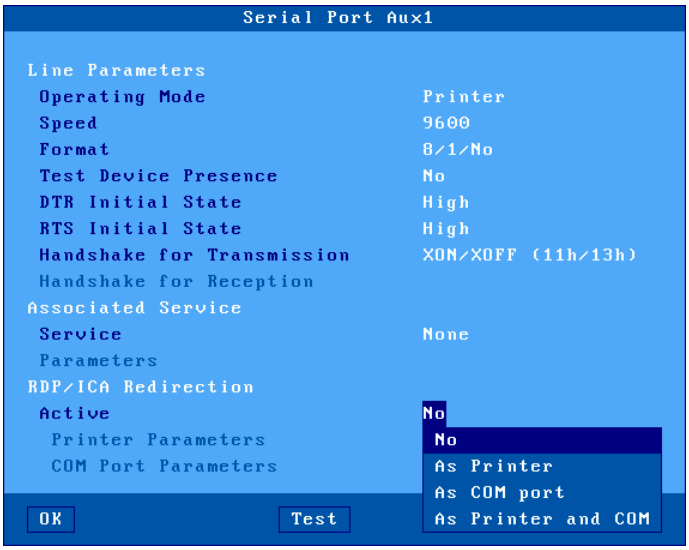
The printer declaration is completed. For the redirection procedure, consult the sub-section c).

b) Declaring a Redirected COM/LPT Port

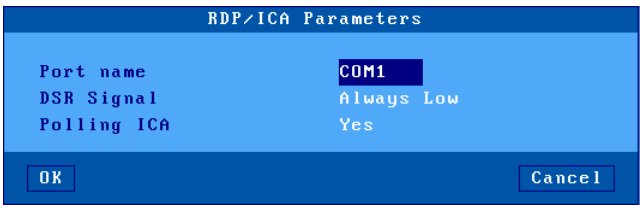
A redirected COM/LPT port will be 'seen' as a local Windows COM/LPT port. Maximum two ports can be redirected.

Before being redirected an RDP/ICA COM Port must be declared at the 'physical port' level. The available ports are: auxiliary ports (parallel, Aux1 and Aux2) and USB logical ports.

Select the dialog box of the 'COM port' (menu **[Configuration]-[Ports]-[xxx]**). For example, the Aux1 port:



Set the 'Active' parameter to 'As COM port' or 'As Printer and COM'. Then select 'COM Port Parameters'. The following box is displayed:



These parameters are:

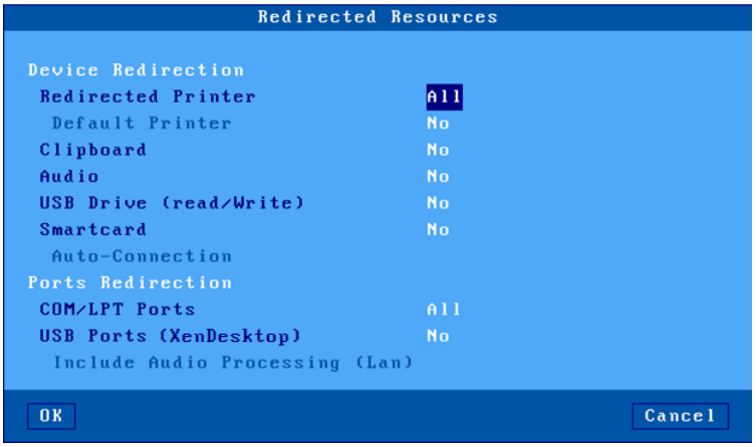
- **Port Name**: redirect COM port name (from COM1 to COM255).
- **DSR Signal** (only for Aux1 and Aux2): the DSR signal is not supported by the AX3000 native auxiliary ports. This parameter allows the incoming DSR value to be emulated. The possible values are: "Always Low", "Always Up", "Follows CTS" or "Follows CD".
- **Polling ICA**: not applicable

Note: for redirecting an LPT port, set the 'Active' parameter to 'As LPT port' or 'As Printer and LPT. The LPT port settings dialog box only offers to customize the LPT name (LPT1 by default).

The port declaration is completed. For the redirection procedure, consult the next sub-section. Then consult sub-section d) for remapping procedure.

c) Redirecting Resources

To redirect resources within a session select the session profile box (menu **[Configuration]-[Sessions]-[Session X]**). Within this box, select 'Redirected Resources'. The following box is displayed:



These parameters are:

- **Redirected Printer**: printer(s) are selected through a list. This list is composed by the following items:
  - **All**
  - **None**
  - ***Printer Name (port)***: these are the RDP/ICA printer name(s). This allows the selection of only one printer to be redirected.
- **Default printer**: set (or not) a printer as the default printer.
- **Clipboard**: enable/disable 'copy and paste'.
- **Audio**: set (or not) the audio redirection ('play' or 'play and record'). The audio quality (and the amount of audio data) can be customized in the bandwidth option. See next chapter.
- **USB Drive**: set (or not) the mass storage device redirection. The 'Access Permission' value is set globally. See Appendix A.8.2.
- **Smartcards**: set (or not) the smartcard redirection.
- **Auto-Connection**: when set to yes, the option allows the ICA session to be automatically established when a smartcard is inserted in the reader.

- **Redirected COM/LPT Port**: COM port(s) are selected through a list. This list is composed by the following items:
  - **All**
  - **None**
  - ***xxx (port)***: these are the COM port name(s). This allows the selection of only one COM port to be redirected.
- **USB Ports (XenDesktop)**: set (or not) the USB Port Redirection for XenDeskop (not supported by XenApp). For more information about 'Eligible Devices' see Chapter 3.2.5.
- **Include Audio Processing (Lan)**: not applicable for Citrix.

d) Remapping a COM/LPT port

Terminal COM ports must be remapped to server COM ports. The remapping commands are "**change client**" or "**net use**". These commands may be issued from a command prompt from the terminal's Citrix session.

Example: the Windows COM4 port is remapped to the terminal COM1 port

net use com4: \\client\com1:

or

change client com4: com1:

Note: this remapped resource is only for the terminal. In this example COM4 is not seen by other users.

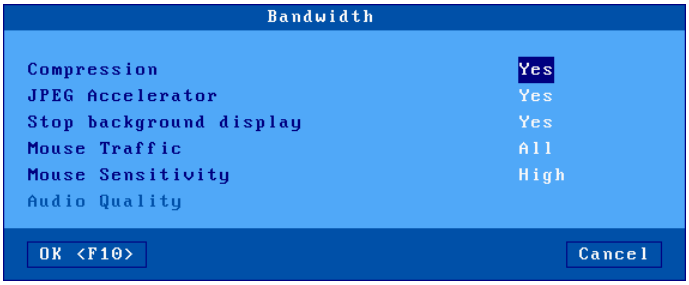
☺: How to set-up a user account to automatically launch a "net use" command.

- Create a shareable directory called Netlogon.
- In this directory create a file called "myscript.bat".
- Enter the 'net use' command line as required in this file.
- Edit the user account properties by selecting the 'profile' tab and set the "Logon script" to read the "myscript.bat" file.

For more details see Windows help on Netlogon.

5.2.9 - Bandwidth

The following box is displayed:



These parameters are:

- **Compression**: this allows Windows to send compressed data. This optimizes bandwidth but in some cases can decrease overall performance.
- **JPEG Decoding**: this allows Windows to send JPEG bitmaps. This optimizes bandwidth but in some cases can decrease overall performance.
- **Stop background display**: by default, when the ICA session is no longer the front session, a 'stop display' command is sent by the thin client to the Citrix server. This can be disabled. But take care to the bandwidth.
- **Mouse Traffic**: the options are:
  - All (default): all mouse events (clicks and position) are sent to the server.
  - Click: only the click events are sent to the server. This reduces the data flow. But the mouse cursor is not updated in real time. This mode can significantly improve bandwidth.
- **Mouse Sensitivity**: This setting varies the sample rate of the mouse. If the sensitivity is increased the mouse movement will be more fluid, but also network activity is increased.
- **Audio Quality**: the bandwidth depends on the audio quality. For remote connections low quality is recommended.

5.3 - REMOTEAPP AND CITRIX RECEIVER DESKTOPS

The Application Desktop can be set-up as:

- **RemoteApp**: connection to Microsoft RemoteApp 2008R2 (or higher).
- **Citrix Receiver**: connection to a Citrix farm.

This feature allows a user, after authentication, to see the icons of his published application on the terminal's desktop.

Launching a published application is simply done by clicking the associated icon.

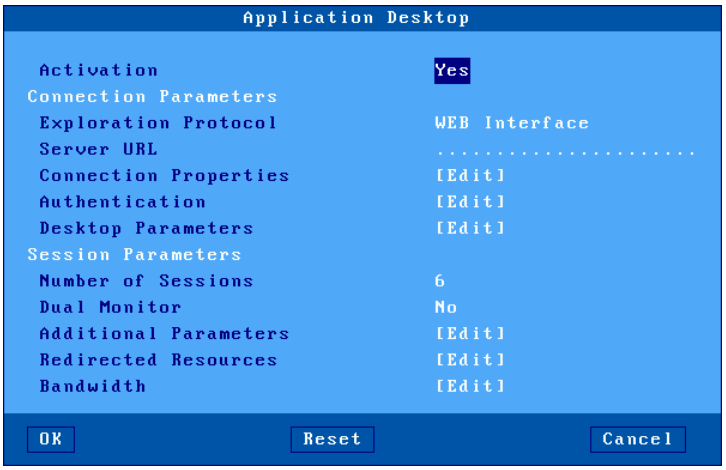
Note: for more information about the concept, please refer to Chapter 3.3.1

5.3.1 - Application Desktop Activation

Enter the terminal set-up (**<Ctrl><Alt><Esc>**) and go to **[Configuration]-[Sessions]**. Then select **[Microsoft RemoteApp Desktop]** or **[Citrix Receiver Desktop]**.

Note: only one Application Desktop is available at a time (RemoteApp or Citrix Receiver)

The following dialog box is displayed:



To enable setting options set 'Activation' to 'Yes'

5.3.2 - 'Connection Parameters' Section

This is a part of the dialog box:

a) Exploration Protocol and Server

The 'Exploration Protocol' option is available only for the Citrix Receiver Desktop (see Chapter 5.2.1). Possible values are:

- WEB Interface: access to a WEB Interface server with a PNAgent site.
- TCP/IP + HTTP: access to a server of the farm (XML port is needed).

Citrix WEB Interface or Microsoft RemoteApp
Server URL: syntax is [https://]server[:port][/config].
- **https**: optional use (default: http)
- **server**: DNS name of IP address of WEB Interface server
- **port**: optional TCP port (default: 80 for http and 443 for https)
- **/config**: optional configuration full pathname. Default is:
  - "/Citrix/PNAgent/config.xml" for Citrix
  - "rdweb/feed/webfeed.aspx" for RemoteApp

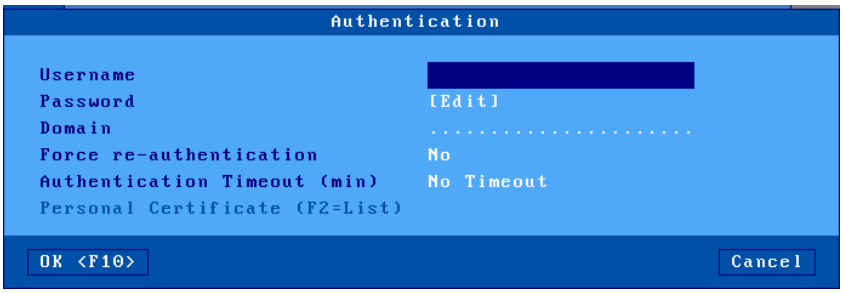
Citrix TCP/IP+HTTP
Server and XML Port: syntax is server[:port]
- **server**: DNS name of IP address of one Citrix server
- **port**: optional TCP port (default: 80)

b) Connection Properties

See Chapter 5.1.2.

c) Authentication

The following dialog box is displayed:

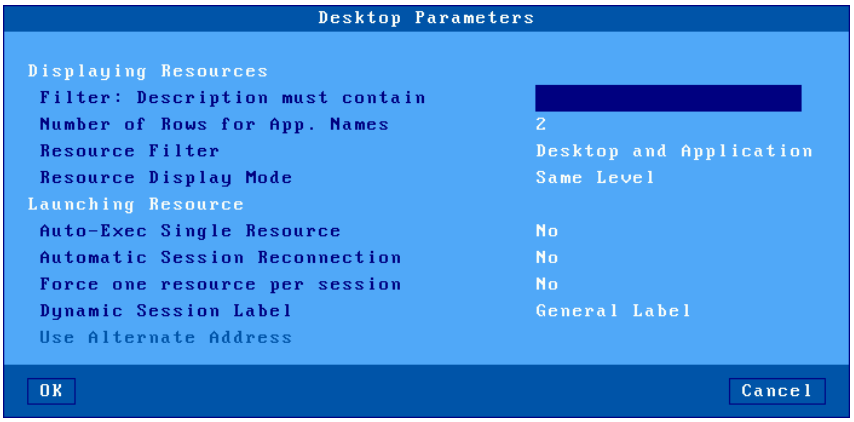


These parameters are:
- **Username**: default value for the username field of the logon screen.
- **Automatic Logon**: set this parameter to 'Yes' to get an automatic logon.
- **Password**: available only if 'Automatic Logon' is set to 'Yes'.
- **Domain**: default value for the Windows domain field of the logon screen.

- **Force re-authentication** (RemoteApp only): If enabling this option, the user will have to re-enter authentication information when launching a published application. Authentication is either username/smartcard or smartcard only.
- **Authentication Timeout**: if a number of minutes is given, after expiration of this delay, the published resource icons will be removed from the terminal desktop.
- **Personal Certificate**: in event of SSL connection, a personal certificate may be requested by the server. This option allows a personal certificate to be predefined to avoid a manual selection by the terminal user.
  Note: this option is disabled if the AX3000 Local Store doesn't contain a certificate.

d) Desktop Parameters

The following dialog box is displayed:



Displaying Resources: these options are used for enumerating resources:

- **Filter: Description must contain** (only for Citrix): this allows displaying only published resources with a description field including the entered character string.
- **Number of Rows for App. Names**: set the number of lines for text (1 to 5) displayed below the application icon, for long names.
- **Resource Filter**: allows Desktops and/or Applications to be enumerated.

- **Resource Display Mode**: when 'Resource Filter' is 'Desktop and Application', this option selects if all resources are displayed at the same level or in two separate folders.

Launching Resource: these options are used for launching the resource:

- **Auto-Exec Single Resource:** if only one resource is published, this option runs it automatically.
- **Automatic Session Reconnection** (only for Citrix and if the previous option is disabled): this parameter, also known as "smooth roaming", allows a user to retrieve his former sessions from another workstation. The reconnected session type can be "**disconnected**" or "**disconnected and active**".
- **Force one resource per session**: with this option a new RDP/ICA session will be created to run each published application. If not set the terminal will try to re-use an existing RDP/ICA session to run a published application, assuming the second application resides on the same server as the first application.
  Note: “Published Desktops” are always started in a new session
- **Dynamic Session Label**: a session label is displayed in the terminal status bar. Four options:
  - General Label: this is the label set in the 'Connection Properties' Box.
  - First Application Label: this is the name of the first application launched on this session.
  - Last Application Label: this is the name of the last application launched on this session.
  - Server Name: this is the DNS name or the IP address or the name in the terminal server table.
- **Use Alternate Address** (only for Citrix TCP/IP +HTTP): set it to 'Yes' when a firewall is present. See CTX039746 in Citrix Knowledge Base

5.3.3 - 'Session Parameters' Section

This is a part of the dialog box:

These parameters are:

- **Number of Sessions:** this sets the number of sessions reserved for published applications.
- **Dual Monitor**: set yes/no.

The following parameters are used dynamically by RDP/ICA to set up the published applications.

- **Additional Parameters**: see Chapter 5.1.5 for RDP and 5.2.7 for ICA.
- **Redirected Resources**: see Chapter 5.1.6 for RDP and 5.2.8 for ICA..
- **Performances** or **Bandwidth**: see Chapter 5.1.7 for RDP and 5.2.9 for ICA.

Notes:

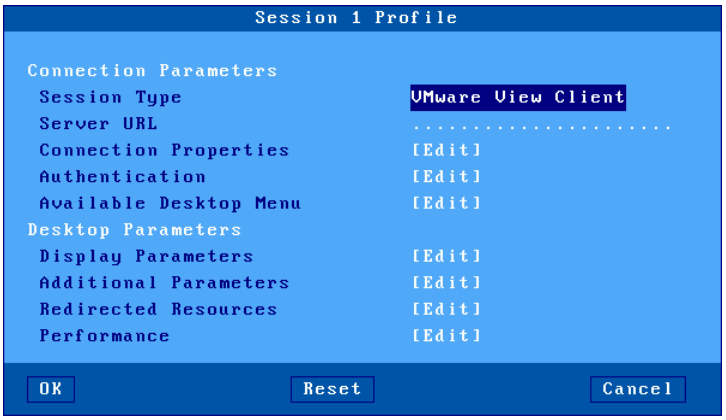
- After changing setup parameters it is necessary to reboot the terminal to ensure the new values are used.
- Once "Application Desktop" is setup the reserved sessions are inaccessible from the setup menus.
- The setting up of an "Application Desktop" activates the status bar allowing sessions to be changed with the mouse.

5.4 - VMWARE VIEW CLIENT SESSION

A **VMware View Client** session lets the terminal to be connected VMware Desktop Virtualization environments.

5.4.1 - Setting-Up the Session

To set a Virtual Desktop session, enter the AX3000 Set-Up and select the **[Configuration]-[Sessions]-[Session X]** menu (where X is the session number to be configured). The following box is displayed:

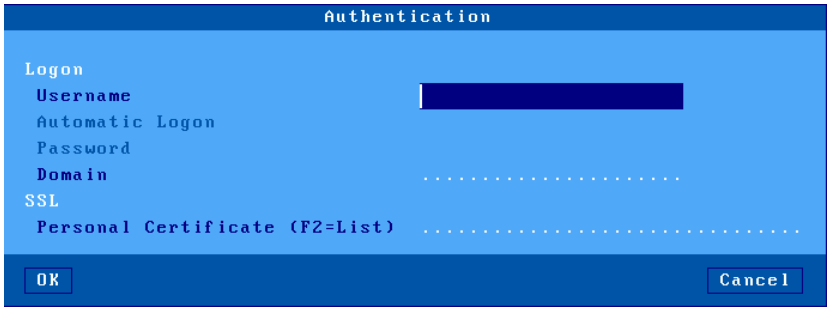


Set the following parameters:

- **Server URL**: syntax is [https://]server[:port]
  - **https**: optional use (default: http)
  - **server**: DNS name of IP address of View server
  - **port**: optional TCP port (default: 80 for http and 443 for https)
- **Connection Properties**: see chapter 5.1.2.
- **Authentication**: permitting the user's name, password and domain to be entered. This removes the need to enter these details for every logon. See sub-chapter a).
- **Available Desktop Menu**: setting-up the virtual desktop list. See sub-chapter b).
- **Display Parameters**: display settings (resolution and colors). See Chapter 5.1.4.
- **Additional Parameters**: a box, which lets certain RDP parameters be changed. See Chapter 5.1.5.
- **Redirected Resources**: set redirected resources. See Chapter 5.1.6.
- **Performance**: a box, which lets certain bandwidth parameters be changed. See Chapter 5.1.7.

a) Authentication

The following box is displayed:

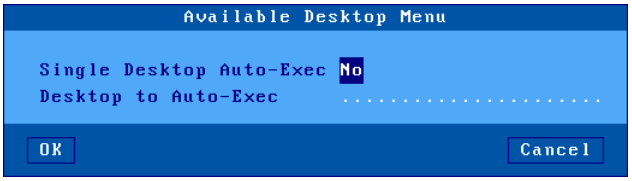


Set the following parameters:

- **Username**: default value for the username field of the logon screen.
- **Automatic Logon**: set this parameter to 'Yes' to get an automatic logon.
- **Password**: available only if 'Automatic Logon' is set to 'Yes'.
- **Domain**: default value for the Windows domain field of the logon screen. (use uppercase letters)
- **Personal Certificate**: in event of SSL connection, a personal certificate may be requested by the server. This option allows a personal certificate to be predefined to avoid a manual selection by the terminal user.
  Note: this option is disabled if the AX3000 Local Store doesn't contain a certificate.

b) Available Desktop Menu

After being authenticated to the connection broker, the virtual desktop list will be displayed. This dialog box allows this list to be customized:



In event of only one desktop is listed, the parameter "**Single Desktop Auto-**

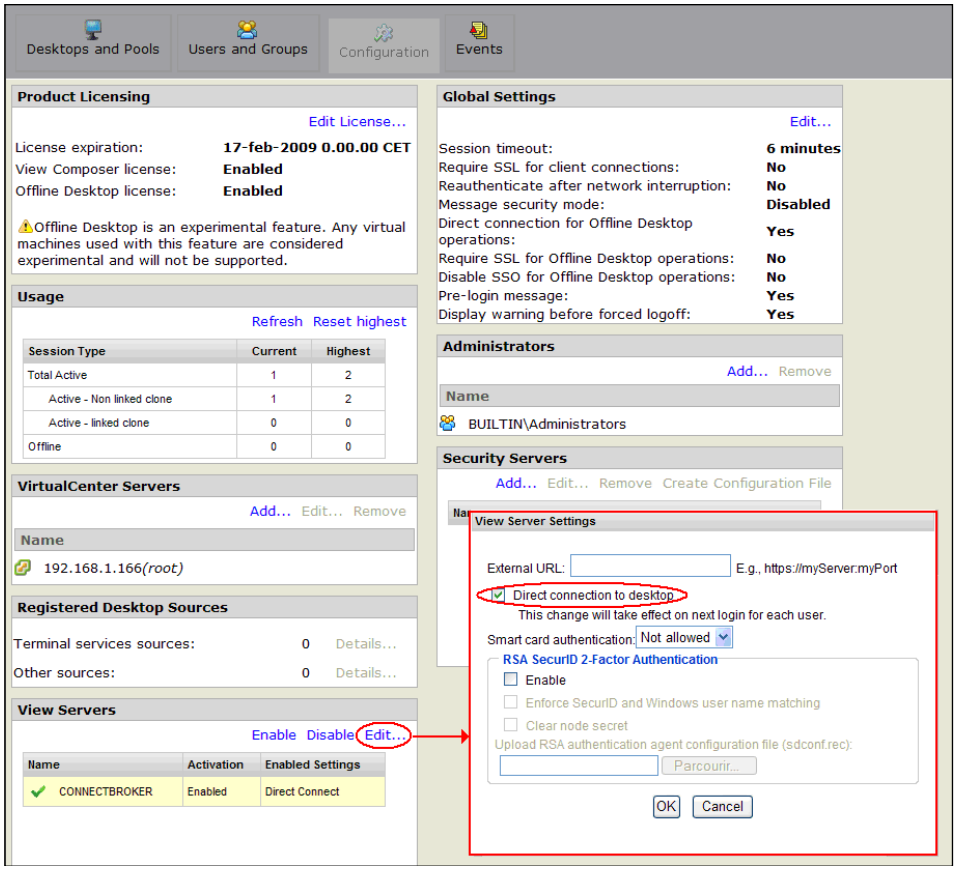
Exec" allows this desktop to be automatically launched.

The parameter "**This Desktop Auto-Exec**" allows a pre-defined desktop to be automatically launched (if available in the desktop list).

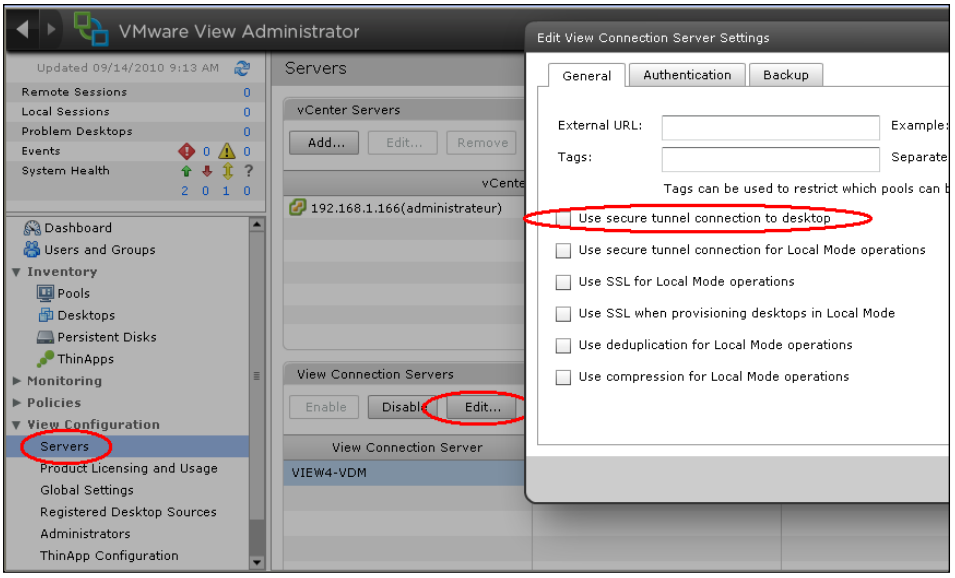
5.4.2 - Configuring the VMware Connection Broker

To use an Axel terminal the VMware connection broker must be configured with "Direct connection to desktop" enabled (after the authentication stage, the broker is no longer used, the RDP connection is directly established to the virtual machine). To check (or change) this parameter, enter the 'View server' configuration.

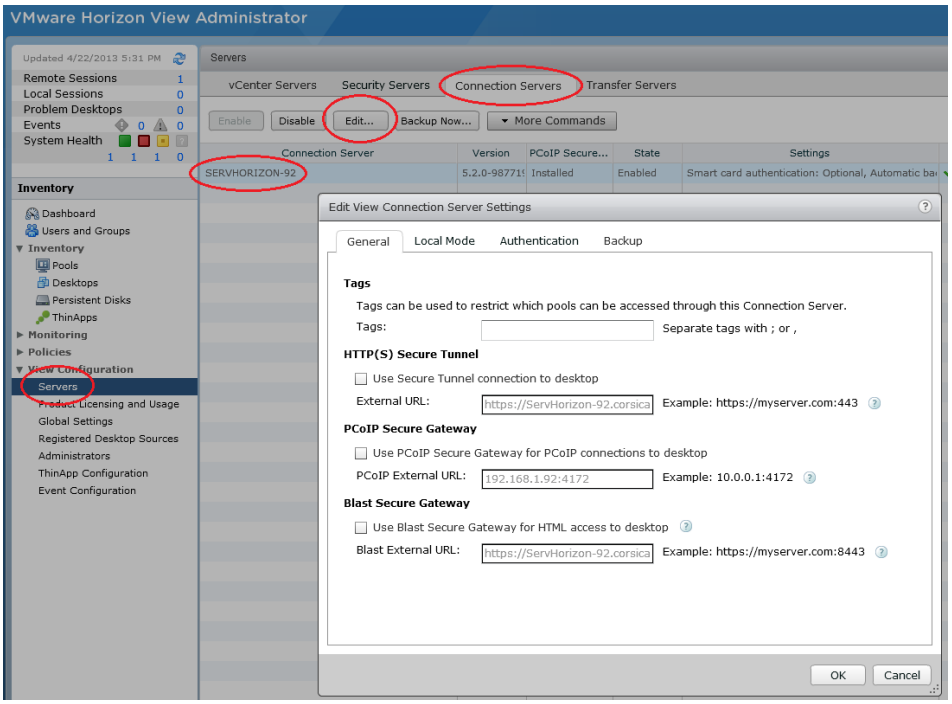
With VIEW 4, enable the '**Direct connection to desktop'** option:


Desktops and Pools
Users and Groups
Configuration
Events
Product Licensing
Edit License...
License expiration: 17-feb-2009 0.00.00 CET
View Composer license: Enabled
Offline Desktop license: Enabled
Offline Desktop is an experimental feature. Any virtual machines used with this feature are considered experimental and will not be supported.
Usage
Refresh Reset highest
Session Type | Current | Highest
Total Active | 1 | 2
Active - Non linked clone | 1 | 2
Active - linked clone | 0 | 0
Offline | 0 | 0
VirtualCenter Servers
Add... Edit... Remove
Name
192.168.1.166(root)
Registered Desktop Sources
Terminal services sources: 0 Details...
Other sources: 0 Details...
View Servers
Enable Disable Edit...
Name | Activation | Enabled Settings
CONNECTBROKER | Enabled | Direct Connect
Global Settings
Edit...
Session timeout: 6 minutes
Require SSL for client connections: No
Reauthenticate after network interruption: No
Message security mode: Disabled
Direct connection for Offline Desktop operations: Yes
Require SSL for Offline Desktop operations: No
Disable SSO for Offline Desktop operations: No
Pre-login message: Yes
Display warning before forced logoff: Yes
Administrators
Add... Remove
Name
BUILTIN\Administrators
Security Servers
Add... Edit... Remove Create Configuration File
View Server Settings
External URL: E.g., https://myServer:myPort
Direct connection to desktop
This change will take effect on next login for each user.
Smart card authentication: Not allowed
RSA SecurID 2-Factor Authentication
Enable
Enforce SecurID and Windows user name matching
Clear node secret
Upload RSA authentication agent configuration file (sdconf.rec):
Parcourir...
OK
Cancel

With VIEW 4.5, disable the '**Use secure tunnel connection to desktop'** option:



With VIEW HORIZON, disable the '**HTTP(S) Secure Tunnel'** option:



5.5 - MANAGING PRINTERS

Auxiliary ports (2 serial and 1 parallel), USB logical ports and network printers are provided by the AX3000. These ports are independently controlled so multiple printers can be attached to the AX3000.

The AX3000 offers an embedded LPD protocol. This protocol is available in most operating systems and allows one or more printers connected to the AX3000 to be accessed as network printers. (I.e. these printers are controlled through the spooler and are available for all authorized users).

Note: Windows 2000 and 2003 support RDP printer redirection. The same

printer can be handled with both LPD and RDP redirection protocols.

The main characteristics of these protocols are:

LPD Protocol: (Server level printer)

- The printer must be added to the Windows spooler by the administrator.
- The printer name is static.
- The printer is available when the terminal is powered-on and can be accessed by any user.
- The printer dataflow is not compressed.
- The display and printer data flows are multiplexed by TCP/IP.
- There is no requirement for any terminal sessions to be connected
- Printer data compression is not possible

RDP/ICA Protocol: (Client level printer)

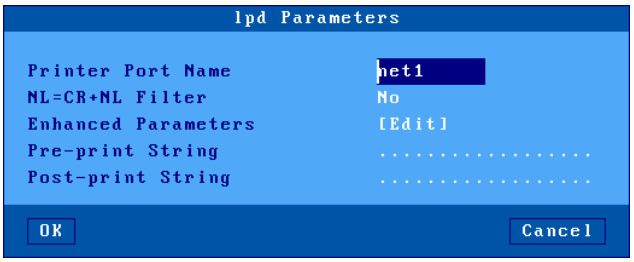
- The printer is automatically created when the session is established.
- The printer name is static: "terminal name / printer name / session X" (the session number can varied).
- The printer is only available when the session is established. This printer is the user default printer. This printer is not "seen" by other users.
- The printer dataflow can be compressed.
- The display and printer data flows are multiplexed by TSE.

The following applies only with LPD printer configuration. For an RDP printer see Chapter 5.1.6 and for an ICA see Chapter 5.2.8.

5.5.1 - Setting-Up the AX3000

To set the LPD service on the terminal port, select the **[Configuration]-[Ports aux.]-[xxx]-[yyy]** dialog and enter the following parameters:

- **Associated Service**: select lpd.
- **Net Service Parameters**:



- **Printer Port Name**: this is the port identifier. Sometimes the same name is used for the printer at the operating system level.
- **NL=CR+NL Filter**: set to "no",
- **Enhanced parameters**: see Appendix A.8.3.
- **Pre-print String**: normally not used.
- **Post-print String**: normally not used.

Note 1: If "Choose Portrait/Landscape" is enabled (see Appendix A.8.2), the parameter "**Pre-print String**" is replaced by the two parameters "**Portrait Pre-print String**" and "**Landscape Pre-print String**".

Note 2: if the auxiliary port used for printing is a serial port, set the 'Printer' operating mode.

5.5.2 - Setting-Up the Windows Server

To add a printer, select the '**Add printer**' icon. Within the displayed dialog box, select '**Local printer**' (Disable the Plug-And-Play detection). Click on 'Next'.

Within the next dialog box, select '**Create a new port**' and select '**LPR Port**'. Click on 'Next'.

Note: if 'LPR Port' is not available, you need to install '**Print Services for Unix'** from the Windows CD-Rom.

Finally within the next dialog box, enter the two parameters requested:

- Name or address of the server providing LPD: AX3000 IP address
- Name of printer or print queue of that server: this is the '**Printer Port Name**' AX3000 Set-Up parameter (see Chapter 2.2).

When this printer is added, all print jobs sent to this printer are automatically redirected to the AX3000.

5.6 - PUBLISHING APPLICATIONS

A Windows TSE application publishing utility (AxMenu or Axel Menu) is available from (http://www.axel.com).

TSE gives the user access to a standard Windows desktop, but this may provide too much freedom for users to access the Windows operating system or applications they are not meant to access. They may also be able to change setup and configuration parameters.

AxMenu allows users access only to applications the administrator has authorized and is often a much more user friendly method to control access as compared to restricting Window's user profiles

The administrator creates a profile for each user which sets the appearance of the screen (Menu, Tool-bar or Desktop) and applications available.

For more information about the AxMenu utility, read the manual "*Axel Menu - Publishing Applications and Securing the Desktop for Windows TSE*".

5.7 - REMOTE ADMINISTRATION

A Windows administration utility (AxRM or Axel Remote Management) is available at no charge from the Axel Web site (http://www.axel.com).

For more information, please refer to Chapter 10.1.

- 6 -
INSTALLING UNDER OS/400

This chapter covers AX3000 installation under OS/400.

This chapter describes the operation of the AX3000 in an OS/400 environment. For more general information about the AX3000 (network and session settings, etc) please refer to the previous chapters.

The AX3000 is able to handle both 5250 screen sessions (tn5250 emulation) and printers (protocols Prt5250 and LPD).

6.1 - 5250 SCREEN SESSION

The IBM 5250 emulation type developed by Axel is IBM-3477-FC.

This emulation provides all the features of an IBM 5250 terminal. Especially:
- Enhanced 5250 telnet protocol (TN5250E): compliant with the RFCs 1205 and 2877 (terminal name negotiation, terminal type negotiation, etc.),
- Color support,
- Screen sizes: 80x24 and 132x27,
- 5250 status line.

6.1.1 - Keyboard Type

a) Setting-Up the Keyboard Type

The AX3000 supports both a 5250 (122 keys) and a PC/AT keyboard (102/105 keys). The keyboard type is not auto-detected.

To set the keyboard type, enter the AX3000 Set-Up and select the **[Configuration]-[Advanced]-[Tuning]** menu. Set the "Keyboard Type" to "PC" or "AS400 (F24)" in the displayed box

Press **<Alt><Rest><SetUp>** to enter the AX3000 Set-Up with an AS400 keyboard.

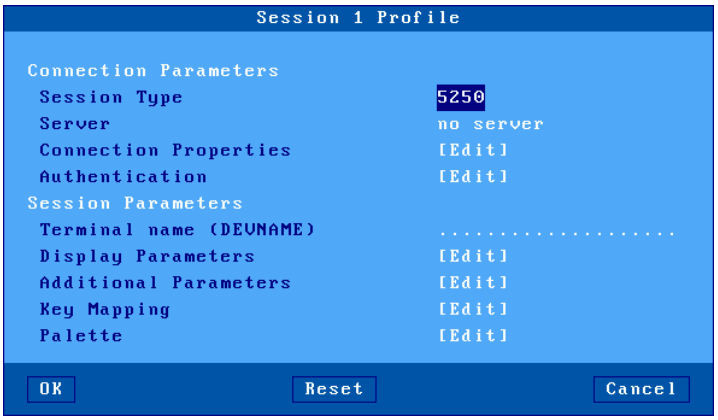
b) In event of problems

If the AX3000 setting is not consistent (a PC keyboard is attached but a 5250 keyboard is declared, or vice versa), the keyboard won't work.

A specific keystroke allows the keyboard type to be dynamically toggled. This keystroke is **<Ctrl><Alt><K>** with a PC keyboard, and **<Rest><Alt><K>** with a 5250 keyboard.

6.1.2 - Setting a Session

To set a profile session, enter the AX3000 Set-Up and select the **[Configuration]-[Sessions]-[Session X]** menu (where X is the session number to be configured). The following box is displayed:



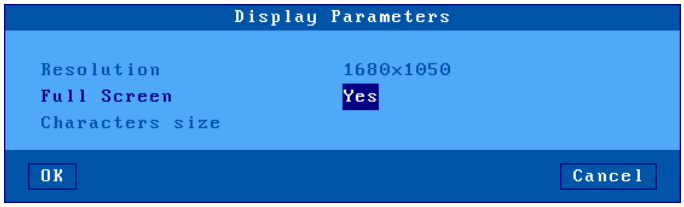
These parameters are:

- **Session Type**: select "5250"
- **Server**: selected from the server table (see Chapter 3.1.4). A new server can be added by selecting 'IP address' or 'Server Name'.
- **Connection Properties**: see Chapter 6.1.6.
- **Authentication**: Auto-Signon function. See Chapter 6.1.5.

- **Terminal Name (DEVNAME)**: if this name is left blank, the OS/400 will associate a dynamic name to this terminal (i.e.: QPADEV001).
- **Display Parameters**: for more information, see the next chapter.
- **Additional Parameters**: lets certain emulation parameters to be changed. See Chapter 6.1.5.
- **Key Mapping**: lets any keys to be remapped. See Chapter 6.1.5.
- **Palette**: lets emulation colors to be remapped. See Chapter 6.1.5

6.1.3 - Display Parameters

The following box is displayed:



These parameters are:

- **Resolution**: For information only. This is the current resolution selected in the [Configuration]-[Terminal]-[Screen] menu.
- **Full Screen**: two possible values:
  - 'Yes': the session is displayed on the entire screen and the character size is automatically adapted to the resolution and the number of lines/columns.
  - 'No': the session is displayed in a 'Window' mode and the character size can be customized.
- **Character Size** (Only when 'Full Screen' is disabled): Two possible values: 'standard' (8x16) or 'double' (16x32).

Note: for more information, please refer to Appendix A.8.5.

6.1.4 - Customizing 5250 Emulation

Various 5250 emulation parameters can be modified but generally the default values are the most suitable.

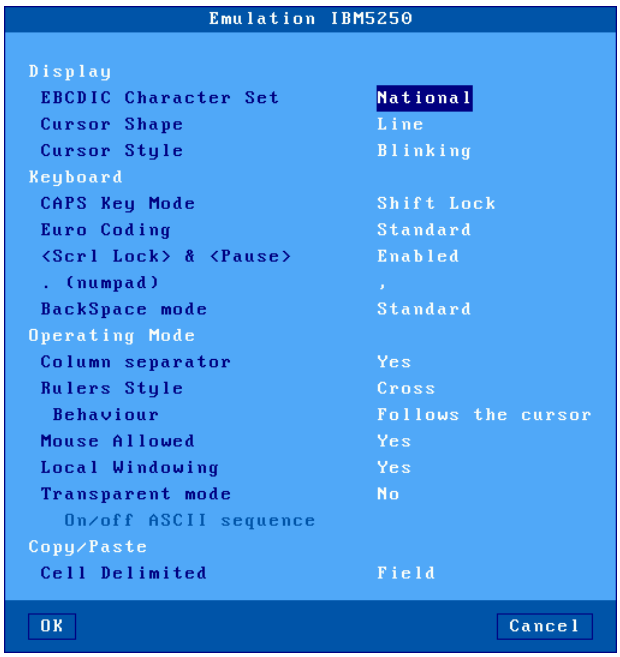
To customize the 5250 emulation, enter the AX3000 Set-Up and select the

session profile (**[Configuration]-[Sessions]-[Session X]** menu). Three groups of parameters control 5250 emulation settings:

- General Parameters: 5250 emulation behavior,
- User-defined Sequences: mapping 5250 functions to any PC keyboard keys.
- Palette: remapping emulation colors.

a) 5250 Emulation General Parameters

The following box is displayed:



These parameters are:

- **EBCDIC Character Set**: possible values are:
  - National (characters are keyboard nationality dependent),
  - Multinational.
  - A specific keyboard nationality (American, French…).
- **Cursor Shape**: Line, Half-Block or Block.

Note: to change the cursor shape from a 5250 session press <Alt><F11> (or <Alt Gr><F11> with a PC keyboard).

- **Cursor Style**: Blinking or Steady.
- **CAPS Key Mode**: set the CAPS LOCK to behave in either of three ways:
  - Caps Lock: each alphabetical key sends the corresponding upper case letter. To unlock this mode press the <CAPS> key.
  - Shift Lock: each key send the same character sent by pressing <Shift><This key>. To unlock this mode press a <Shift> key.
  - Uppercase: each key send the upper character if it is present. Otherwise, this is the lower character (upper-case letter if possible) which is sent. <Shift> key acts in the standard way (whatever the CAPS key). To unlock this mode press the <CAPS> key.
  - Caps Lock +: same as 'Shift Lock'. But in addition ALL the keys supported (including <Esc>, function keys...).
- **Euro Coding**: Euro symbol support. The three possible values are:
  - No: no specific processing is done
  - Standard: the Euro symbol replaces the international currency symbol '¤' within the current character set.
  - Custom: any character can be replaced by the Euro symbol within the current character set (use the decimal notation).
- **<Scroll Lock> & <Pause>:** enable or disable these two keys
- **<.> (numpad)**: the two available values are the dot (.) and the comma (,).
- **Backspace Mode**: the two available values are:
  - Standard: move cursor left
  - Suppress: deleting the character on the left of the cursor location
- **Column Separator**: the two possible values are:
  - No: this video attribute is not displayed.
  - Yes: this video attribute is displayed, but due to VGA limitations, it is displayed as underlining.
- **Rulers Style**: the "rule" function allows the cursor to be located easily among other characters. Three types of rules are available:
  - Cross: a horizontal line and a vertical line indicate the cursor location,
  - Horizontal: a horizontal line is displayed at the cursor line,
  - Vertical: a vertical line is displayed at the cursor column.

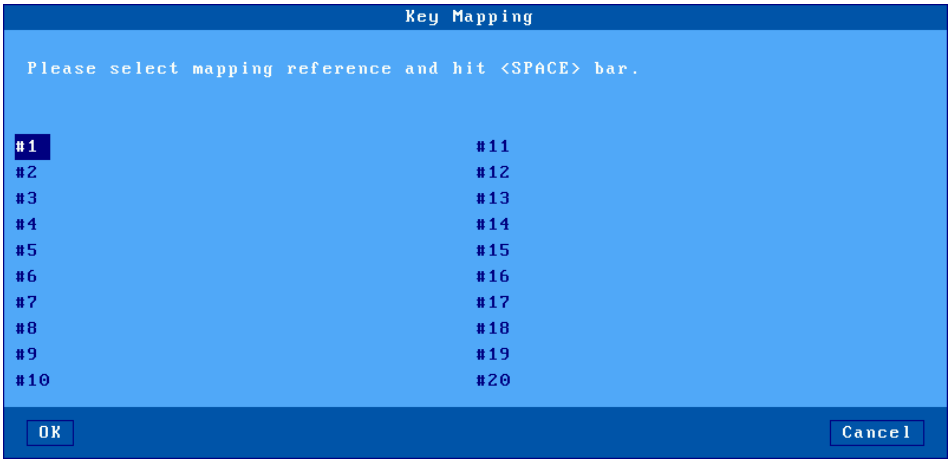
  Press <Rule> (or <Alt Gr><F12> with a PC keyboard) to enable/disable the rule function from a 5250 session.
- **Behavior**: two values: Follows the cursor / Fixed
- **Mouse Allowed**: enable/disable the mouse within this session

- **Local Windowing**: this parameter sets the window display mode. Two values:
  - No: windows are displayed with the original characters ('.' and ':'),
  - Yes: windows are displayed with "real" frames.
- **Transparent Mode**: this mode allows ASCII data to be sent to auxiliary ports (serial, parallel…). The possible values are:
  - No
  - Yes: data can be encoded in decimal and hexadecimal notations
  - Yes, hexa: data is encoded only in hexadecimal notation.
- **On/Off ASCII Sequence**: start and stop transparent mode sequence. For more information see Chapter 6.2.5.
- **Cell Delimited**: Cut & Paste behavior.

b) Remapping 5250 Functions to any PC Keyboard keys

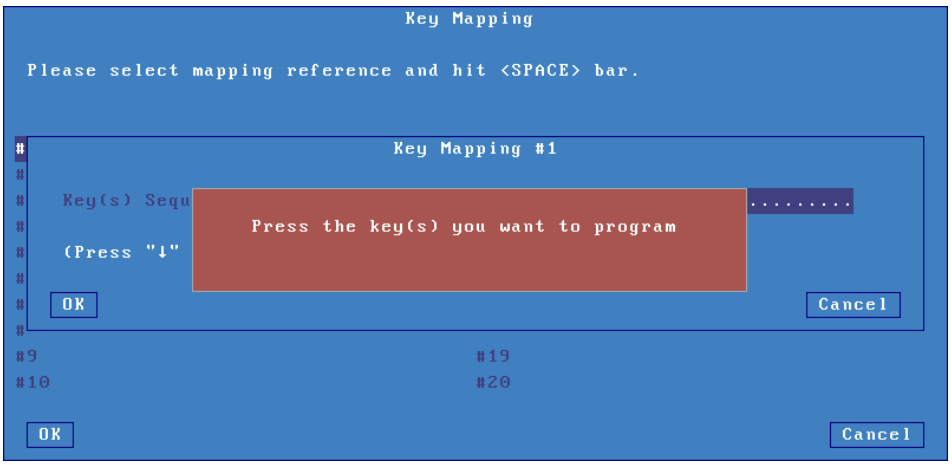
This allows any key to be remapped to any 5250 function and/or character string.

The following box is displayed:



Up to 20 sequences can be remapped (from #1 to #20).

To program a new sequence (or to modify an existing one) select the sequence number. The following dialog box is displayed:

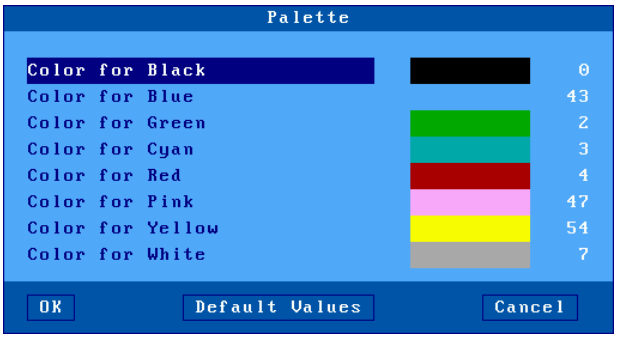


Enter the keystroke to be remapped. Then enter a character string and/or press <Down Arrow> to select through a list the associated 5250 function.

c) Palette

This allows default emulation colors to be remapped to any color.

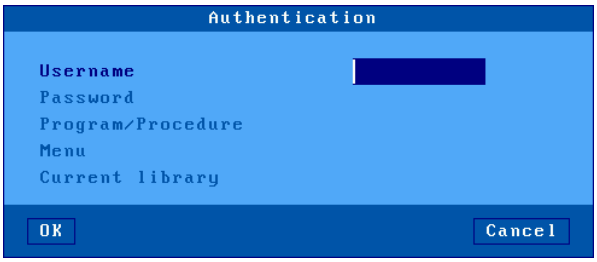
The following box is displayed:



Select one of the 8 emulation colors and associate it with another color.

6.1.5 - Setting-Up the Auto-Signon Function

The following box is displayed:



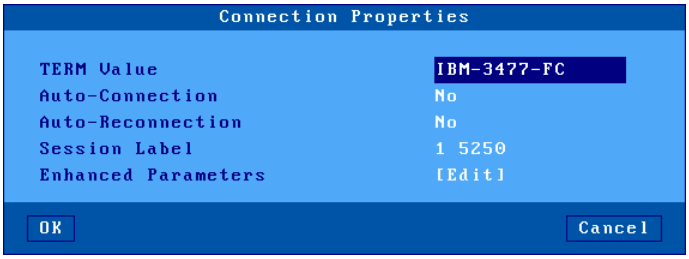
This box allows a value to be entered for each parameter displayed within an AS/400 Signon Screen:

- **Username**: predefined user name
- **Password**: available only if 'Username' is not empty.
- **Program/Procedure**: available only if 'Username' is not empty.
- **Menu**: available only if 'Username' is not empty.
- **Current Library**: available only if 'Username' is not empty.

Important: the auto-signon function must be allowed at the OS/400 level. To enable it set the QRMTSIGN variable to *VERIFY (command CFGTCP).

6.1.6 - Connection Properties

The following box is displayed:



These parameters are:

- **TERM Value**: terminal capabilities. Default value is IBM-3477-FC.
- **Auto-Connection**: if this parameter is set to 'yes', the connection will be automatically established when the AX3000 is powered. Otherwise, the user can press <Alt><Fx> to establish the connection.
- **Auto-Reconnection**: if this parameter is set to 'yes', a new connection is automatically established after a disconnection. Otherwise, the user can press <Alt><Fx> to establish a new connection.
- **Session Label**: this character string (11 characters max.) is used to identify the session within the local desktop or in the status bar.
- **Enhanced Parameters**: see Appendix A.8.3.

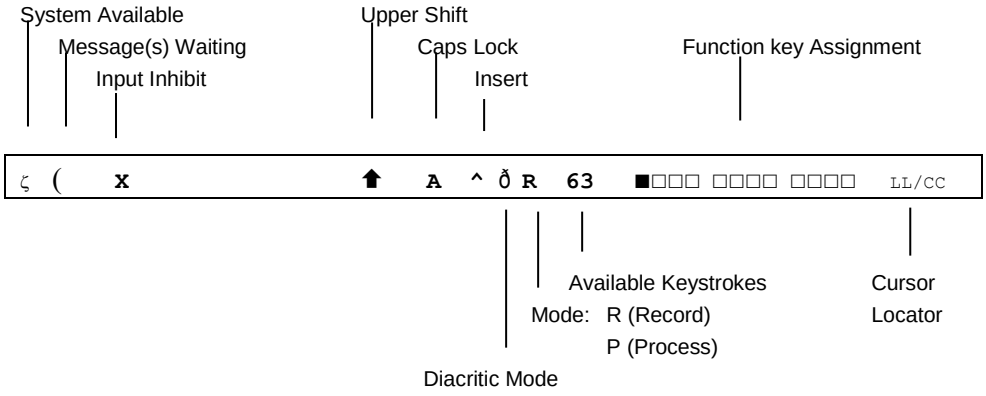
6.2 - USING THE AX3000

6.2.1 - The 5250 Status Line

Note: the 5250 status line is different than the AX3000 TCP/IP status line. (The AX3000 TCP/IP status line displays information about current connected sessions. This line can be enabled/disabled through the AX3000 Set-Up).

The 5250 status line is displayed at the bottom of the screen and gives the

following information:



The status symbols are described in the following table.

Symbol	Name	Meaning
ζ	System Available	The host system is operating and available
(	Message(s) Waiting	This symbol, and a beep, indicate the host system has one or more messages for the terminal.
X	Input Inhibit	This symbol is displayed when: - the host system is processing the last input - the host system is very busy - the host system detects an error condition
⬆	Upper Shift	<Shift> is currently pressed
A	Caps Lock	The keyboard is in Caps Lock mode
^	Insert	The insert mode is enabled (<Inser> key)
ð	Diacritic Mode	This symbol is displayed when the diacritic mode is enabled. This mode is automatically set when a composed character is currently entered (^ + e = ê)
R	Record	The "Record" mode is set (see Chapter 6.2.3)
P	Process	The "Process" mode is set (see Chapter 6.2.3)
LL/CC	Cursor Locator	LL and CC indicate the row and column where the cursor is located

6.2.2 - Using the Keyboard

Two types of keyboard can be used with the AX3000: a PC/AT (102/105-key) or a 5250 (122-key) keyboard. The following tables list the 5250 functions and the Axel functions (entering the set-up, etc) accessed from these keyboard.

5250 Functions:

5250 Functions	5250 Keyboard	PC/AT Keyboard
Attention	<Attn>	<Esc> or <Alt Gr><Pause>
Back tabulation	<|← > or <Shift><→|>	<Shift><Tab>
Clear end of field	<ErInp>	<End>
Clear all fields	<Alt><Clear>	<Pause>
Cursor shape (Ch. 6.1.3)	<Cursor>	<Alt Gr><F11>
Duplication	<Dup>	<Shift><Insert>
Enter	<Enter>	<Enter>
Euro symbol	<Alt><E>	<Alt Gr><E>
Execute macro	<Exec>	<Alt Gr><F5>
F1...F12	<F1>...<F12>	<F1>...<F12>
F13...F24	<F13>...<F24>	<Shift><F1>...<Shift><F12>
Fast left	<Shift><←>	<Shift><←>
Fast right	<Shift><→>	<Shift><→>
Field -	<Field ->	<-> (numpad)
Field +	<Field +>	<+> (numpad)
Field Exit	<Field Exit>	<Entr> (numpad)
Help	<Help>	<Alt Gr><F1>
Hexa	<Alt><Help>	<Alt Gr><F7>
Home of field	<Alt><Rule>	<Home>
New Line	<↵>	<Ctrl Right>
Print (local mode in PC850)	<Rest><Alt><Print>	<Ctrl><Alt><Prt Scr>
Print (Print HOST mode)	<Print>	<Prt Scr>
Record Macro	<Record>	<Alt Gr><F4>
Reset	<Rest>	<Ctrl Left>
Roll Down	<Shift><↓>	<Page Up> or <Shift><↓>
Roll Up	<Shift><↑>	<Page Down> or <Shift><↑>
Rule (see Chapter 6.1.3)	<Rule>	<Alt Gr><F12>
System Request	<Shift><Attn>	<Shift><Esc> or <Alt Gr><Prt Scr>
Tabulation	<→|>	<Tab>

Axel Functions:

Axel Function	5250 Keyboard	PC/AT Keyboard
AX3000 Shutdown	<Rest><Alt><Del>	<Ctrl><Alt><Del>
AX3000 Set-Up	<Rest><Alt><SetUp>	<Ctrl><Alt><Esc>
Disconnecting the session	<Rest><Alt><D>	<Ctrl><Alt><Shift><D>
Sending data to aux. port	<Alt right><F2>	<Alt Gr><F2>

6.2.3 - Programming Function Keys (Macro Feature)

The Axel 5250 emulation allows function keys to be programmed. For example a series of keystrokes can be recorded and played back by pressing a single key.

The recorded data is stored in non-volatile memory so is not affected by switching off.

Recorded keystrokes can be assigned to any of the 24 function keys (<F1> to <F12> or <Shift><F1> to <Shift><F12>).

a) Programming a Function Key

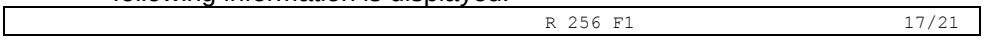
To record a series of keystrokes proceed as follows:
- Press **<Alt Gr><F4>** to set the record mode,
- Press any of the 24 function keys to which you want to assign,
- Type the key sequence you want to save,
- Press **<Alt Gr><F4>** to exit the record mode.

Notes:
- Memory usage: 256 recordable keystrokes per function key.
- To delete a recorded function key, you have to record an empty key sequence.

Example:

1 - Press **<Alt Gr><F4>** to set the Record mode. The 5250 status line is set in reverse video mode and the following information is displayed:
    - Maximum recordable keystrokes for the terminal
    - The 24 boxes are the 24 function keys, a solid box means that data is recorded)

2 - Press one of the function keys (<F1> to <F12> or <Shift><F1> to <Shift><F12>). The 5250 status line is set in normal mode and the following information is displayed:



Note: 'R' indicates the Record mode. The second field is the maximum keystrokes that can be recorded for this session. The third field is the selected function key.

3 - Type the key sequence.

4 - To exit the Record mode, press **<Alt Gr><F4>**.

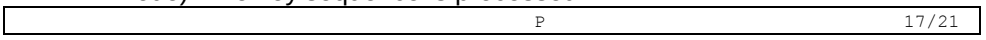
b) Processing a Key Sequence

To execute a series of keystrokes that have been recorded:
- Press **<Alt Gr><F5>** to set the Process mode,
- Press the recorded function key,
- The key sequence is processed.

Example:

1 - Press **<Alt Gr><F5>** to set the Process mode. The 5250 status line is set in reverse video mode and the following information is displayed (the 24 boxes are the 24 function keys, a solid box means that data is recorded):

2 - Press the recorded function key (<F1> to <F12> or <Shift><F1> to <Shift><F12>). The 5250 status line is set in normal mode and the following information is displayed (the 'P' symbol indicates the Process mode). The key sequence is processed:



Note: during the process mode, the input is inhibited.

6.2.4 - The Mouse

Note: the mouse must be enabled. See Chapter 6.1.3.

Four mouse actions are possible:

- **Left-click**, two possible actions are possible depending on the character string under the mouse cursor:
- If the character string is a function key label, this function key is sent (keystroke emulation).
- Otherwise the text cursor is moved to the mouse cursor location.
- **Double left-click**, two possible actions are possible depending on the character string under the mouse cursor:
- If the character string is a function key label, this function key is sent (keystroke emulation).
- Otherwise the character string + <Enter> are sent (keystroke emulation).
- **Right-click**: roll up is sent (keystroke emulation).
- **Double right-click**: roll down is sent (keystroke emulation).

Note: identifying the character string under the mouse cursor
The character string delimiters are:

- Video attributes,
- And the following EBCDIC codes: 00, 40, 4A, 4B, 4C, 4D, 4E, 5A, 5C, 5D, 5E, 60, 61, 6B, 6E, 6F, 7A, 7E, C0 and D0.

Example for the character string "F3=Exit":

- Left-click or double-left-click on "F" or "3": <F3> is sent
- Double-left-click on "E": Exit + <Enter> is sent.

6.2.5 - The Transparent Mode

The transparent mode function allows OS/400 application developers to send ASCII data to the Axel terminal and/or the auxiliary and logical ports.

The transparent mode can be used with:

- **A screen session** (see Chapter 6.1.4): data is output to specified resource (screen or auxiliary port).
  Example: addressing scales (in conjunction with the ASCII to EBCDIC function).
- **A printer session** (see Chapter 6.3.1): data is output to this session port.

a) Start and Stop Sequence

Enable the transparent mode and select the start and stop sequence (default value: @%@)

b) Operating Mode Rules

The transparent mode is driven by the following rules:

- For a screen session, enable the transparent mode by sending the transparent sequence (@%@) followed by the port number:
  0: default port.
  1 to 3: native auxiliary ports (Aux1, Aux2 and parallel)
  4 to 5: network printer (Net1 and Net2).
  6 to 9: USB logical ports (Usb1, Usb2, Usb3 and Usb4).

- For a printer session, send only the transparent sequence to enable the transparent mode.

- In both case, the transparent mode is disabled when the transparent sequence is sent a second time.

- The character remapping is based on PC850 ASCII table (as with the ASCII to EBCDIC function).

c) Character or Hexadecimal Mode

The two transparent modes are:

- **Character Mode**: the dataflow can contain both ASCII characters and hexadecimal ASCII code. The hexadecimal code must began by a / and the ASCII code is encoded by two digit (between 0 and F).
  Example: Esc AB <RC> is \1BAB\0D
- **Hexadecimal Mode**: the dataflow contains only hexadecimal codes (encoded by two digits).
  Example: Esc AB <RC> is 1B41420D

d) Examples

With the following examples the start and stop sequence is @%@

Example 1: Screen session, character mode

When this EBCDIC data is received:
`@%@1/1Bat/2F@%@` (44 6C 44 F1 61 F1 C2 81 A3 61 F2 C6 44 6C 44)

This ASCII data is sent to the AUX1 port:
`<ESC>at/` (1B 61 74 2F)

Example 2: Printer Session, character mode

When this EBCDIC data is received:
`@%@/1Bat/2F@%@` (44 6C 44 F1 61 F1 C2 81 A3 61 F2 C6 44 6C 44)

This ASCII data is sent to the auxiliary port of this printer session:
<ESC>at/ (1B 61 74 2F)

e) Handling DTR and RTS Signals

The transparent mode can also be used to control, from a screen session, DTR and RTS output signals.

The command syntax is the following:
@DTR Port Action
@RTS Port Action

Where:
Port: port numbers are listed in sub-section b
Action: signal is low if this value is 0. Else signal is high.

6.3 - 5250 PRINTER

Auxiliary ports, USB logical ports and network printer ports are provided by the AX3000. These ports are independently controlled so multiple printers can be attached to the AX3000.

These printers can be controlled by one of two protocols:

- **Prt5250**: this service (RFC 2877) is OS/400 oriented. A printer controlled by this service is seen as a standard spooled system printer device.
- **LPD**: this service (RFCs 1048 and related) is provided as a standard feature by major operating systems (Unix/Linux, NT, etc.). The main benefit of this protocol is an LPD printer can be shared by different operating systems. But LPD restrictions are:
    - The printer must be manually added to OS/400,
    - The printer is accessed through an outqueue (and not a device),
    - The printer job manipulation is not fully supported.

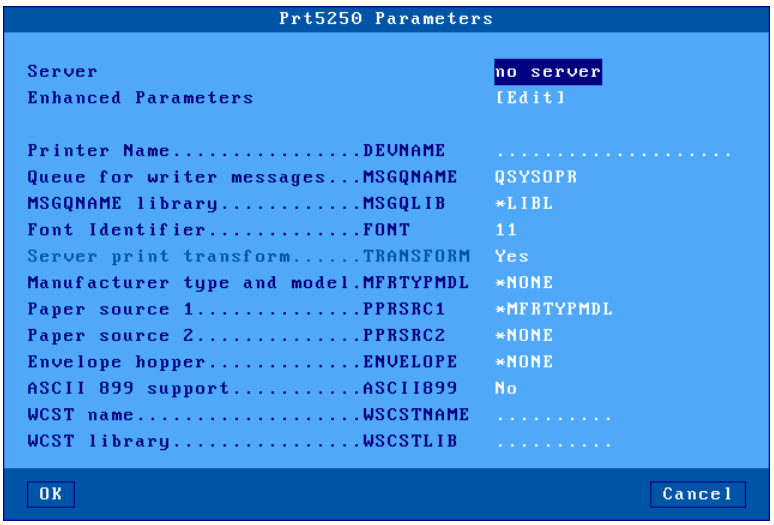
Normally the Prt5250 protocol is preferred. (No printer declaration is needed at OS/400 level). But the LPD protocol allows the printer to be shared between different operating systems. Choose the protocol which best fits your needs.

6.3.1 - Setting-Up and Using a Prt5250 Printer

a) General Settings

To set the Prt5250 service, enter the AX3000 Set-Up and select **[Configuration]-[Ports]-[xxx]-[yyy]**.

In the displayed box, set the "Associated Service" to "Prt5250", then select "Net Service Parameters". The following box is displayed:



These parameters are:

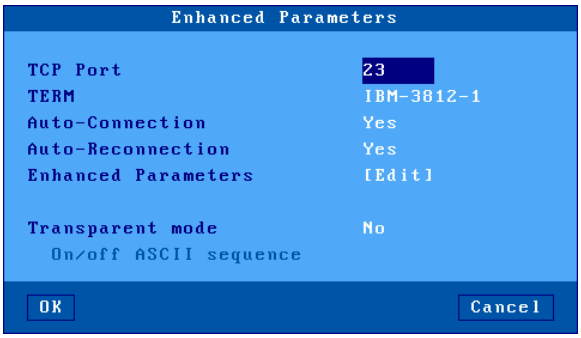
- **Server**: selected from the server table (see Chapter 3.1.4). A new server can be added by selecting 'IP address' or 'Server Name'.
- **Enhanced Parameters**: See next sub-chapter.
- **Printer Name (DEVNAME)**: printer device name.
- **Queue for Writer Messages (MSGQNAME)**: message queue name to which the printer messages will be sent.
- **MSGQNAME Library (MSGQLIB)**: associate message queue library.
- **Font Identifier (FONT)**: font number (3, 4 or 5 digits).
- **Host Print Transform (TRANSFORM)**: always 'yes'.
- **Manufacturer Type and Model (MFRTYPMDL)**: enter the printer driver name (ex: *NONE, *HP4, *NECP2...).
- **Paper Source 1 (PPRSRC1)**: selected through list.
- **Paper Source 2 (PPRSRC2)**: selected through list.
- **Envelope hopper (ENVELOPE)**: describes the paper source 3 (selection through list).
- **ASCII 899 support (ASCII899)**: specifies if the code page ASCII 899 is supported by the printer.
- **WSCST name (WSCSTNAME)**: qualified name of the customizing object.

- **WSCST library (WSCSTLIB)**: associated library.

Note: if the auxiliary port used for printing is a serial port, set the 'Printer' operating mode and set the associated parameters (baud rate, handshake, etc).

b) Enhanced Parameters

The following dialog box is displayed:



These parameters are:

- **TCP Port**: OS/400 telnet port. Generally 23.
- **TERM Value**: do not change.
- **Auto-Connection**: if this parameter is set to 'yes', the connection will be automatically established when the AX3000 is powered. Otherwise, the user can press <Alt><Fx> to establish the connection.
- **Auto-Reconnection**: if this parameter is set to 'yes', a new connection is automatically established after a disconnection. Otherwise, the user can press <Alt><Fx> to establish a new connection.
- **Enhanced Parameters**: see Appendix A.8.3.
- **Transparent Mode**: this mode allows ASCII data to be sent to printer session port. The possible values are:
  - No
  - Yes: data can be encoded in decimal and hexadecimal notations
  - Yes, hexa: data is encoded only in hexadecimal notation.
- **On/Off ASCII Sequence**: start and stop transparent mode sequence. For more information see Chapter 6.2.5.

c) Using the Printer

The Prt5250 service is a client service. This means that each Prt5250 auxiliary port opens a connection to the AS/400 when the AX3000 is powered-on. From the AS/400, a printer is available once the associated Prt5250 connection is established.

A printer handled through the Prt5250 service is seen as a standard spooled OS/400 printer and is managed through standard system commands:

```
===> GO PRINTER
```

d) In Event of Problems

Nothing is printed: this is a quick test to check the hardware (AX3000 parallel/serial port, cable and printer):

- In the AX3000 Set-Up, select **[Configuration]-[Ports]-[xxx]**. Within the displayed box, select the **[TEST]** button.
- A test banner should be printed.

If not there is a basic hardware problem that needs to be fixed. Check cable, check cable is attached to correct port in back of AX3000 etc.

When the AX3000 printer is not "seen" by the OS/400 spooler the following problems can be suspected.

To establish why a Prt5250 session has been refused, enter the AX3000 Set-Up and select the menu **[Diagnostics]-[Connections]**.

Within the displayed dialog box, click the **[Refresh]** button. Read the information displayed for the printer port.

Note: if no information is displayed, double-check that the auxiliary port is associated with the right AS/400 host.

When the connection status continually cycles through CLOSED to CONNECT and there is no error number displayed at the end of the line, the device name is already used by another connection.

If the Prt5250 connection status is 'closed' in the displayed box, an error number

is displayed at the end of the line.

The main error codes are:

- **8903** (Device not valid for session): the printer name is used for another connection.
- **8925** (Creation of device failed): during the printer creation operation, at least one parameter is detected wrong (ex.: non-existing printer model).
- **8928** (Change of device failed): during the printer modification operation (reconnection with different parameters), at least one parameter is detected wrong (ex.: non-existing printer model).
- **8930** (Message queue does not exist.): the message queue or its library doesn't exist.
- **AX01** (Terminal type not recognized): the TERM variable (by default IBM-3812-1) associated with the AX3000 auxiliary port is not correct.

Note: all possible errors are listed in the RFC 2877.

6.3.2 - Setting-Up and Using an LPD Printer

Set the auxiliary port as shown in Chapter 3.5.2.

To add a system printer invoke the following command (AXPRT01 is the OS/400 printer name):

```
===> CRTDEVPRT DEVD(AXPRT01) DEVCLS(*VRT) TYPE(3812) MODEL(1) FONT(11)
```

To associate this printer with the AX3000 LPD port, you have to change its outqueue:

```
===> CHGOUTQ OUTQ(AXPRT01) RMTSYS(*INTNETADR) RMTPRTQ('PARALLEL')
CNNTYPE(*IP) DESTTYPE(*OTHER) TRANSFORM(*YES) MFRTYPMDL(*NECP2)
INTNETADR('192.168.1.240')
```

Where:

- AXPRT01 : OS/400 outqueue name
- PARALLEL : AX3000 Printer Port Name
  Uppercase letters are required
- *NECP2 : printer model (here a NEC type P2)
- 192.168.1.240 : AX3000 IP address

Note: if the outqueue is not started, invoke the STRRMTWTR command.

At the OS/400 level this printer is seen as an outqueue and is not allowed to control it as a device. (For example, it is not possible to start or stop the printer).

6.4 - REMOTE ADMINISTRATION

A Windows administration utility (AxRM or Axel Remote Management) is available free on the Axel Web site. See Chapter 10.1.

6.5 - FURTHER OPTIONS

6.5.1 - Turning-Off the AX3000

Care should be taken before turning off the terminal (as the AS/400 cannot detect a TCP/IP device being turned-off). For graceful terminal shutdown use the **<Ctrl><Alt><Del>** keystroke combination.

6.5.2 - Reconnection Problem

If an AX3000 5250 session is set with a specific DEVNAME, problems can occur if it is not cleanly shutdown before being switched off.

If the terminal is powered off without signing off first the AS/400 will be unaware the connection is broken and will still consider the connection to be valid and in use. If the terminal then tries to sign on with the same devname the AS/400 will refuse connection.

This problem can be solved by tuning **'keepalive'** function of the OS/400 Telnet Server. The keepalive function allows sessions to time out and die after a certain time. Keepalive probes are automatically sent by the OS/400 host when a connection has been idle for a specified time. If the TCP/IP peripheral does not respond, the connection is dropped. The socket is released and applications associated with the connection are killed.

Note: to check the status of sockets, use the OS/400 `netstat` command.

By default, the keepalive time out value is very high (sometimes infinite). So this value must be decreased to allow the OS/400 to check regularly the TCP/IP connection status. Invoke the following command to change this value (xxx are seconds):

```
===> CHGTELNA TIMMRKTIMO(xxx)
```

This modification will take effect after restarting the telnet server:

```
===> ENDTCPSVR SERVER(*TELNET)
===> STRTCPSVR SERVER(*TELNET)
```

IMPORTANT: using a small keepalive value can prevent routers from dropping the ISDN line and cause high connection bills.

- 7 -
INSTALLING UNDER OS/390

This chapter covers AX3000 installation under OS/390 zSeries.

This chapter is dedicated to the operation of the AX3000 in the OS/390 environment. For more general information about the AX3000 (network and session settings, instructions for users, etc) please refer to the previous chapters.

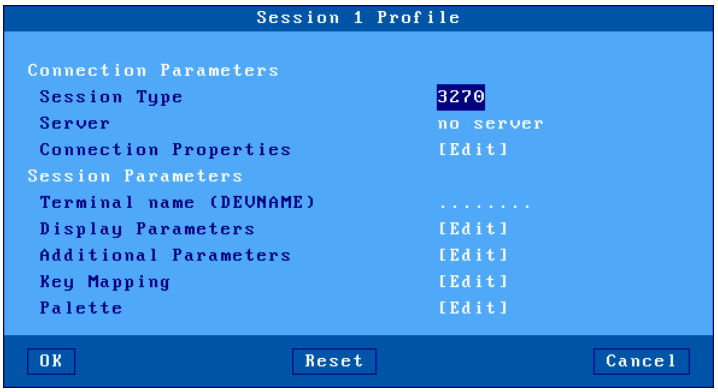
7.1 - 3270 SCREEN SESSION

The IBM 3270 emulation type developed by Axel provides all the features of an IBM 3270 terminal. Especially:

- The 3270 telnet protocol (TN3270): compliant with the RFC 1646,
- Enhanced 3270 telnet protocol (TN3270E): compliant with the RFC 2355,
- The device type negotiated by the AX3000 is IBM-3278-2-E:
    - Color support,
    - Screen sizes: 80x24, 80x32, 80x43 and 132x27,
    - 3270 status line.

7.1.1 - Setting a Session

To set a profile session, enter the AX3000 Set-Up and select the **[Configuration]-[Sessions]-[Session X]** menu (where X is the session number to be configured). The following box is displayed:

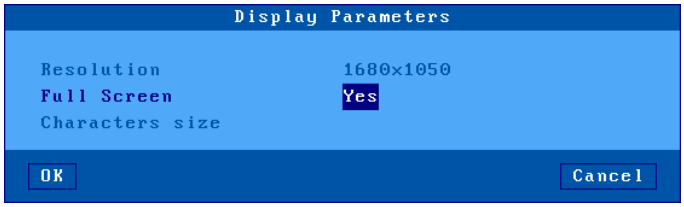


These parameters are:

- **Type**: select "3270"
- **Server**: selected from the server table (see Chapter 3.1.4). A new server can be added by selecting 'IP address' or 'Server Name'.
- **Connection Properties**: see Chapter 7.1.4
- **Terminal Name (DEVNAME)**: this optional name identifies the terminal connection at the OS/390 level.
- **Display Parameters**: see the next chapter.
- **Additional Parameters**: lets certain emulation parameters to be changed. See Chapter 7.1.3.
- **Key Mapping**: lets any keys to be remapped. See Chapter 7.1.3.
- **Palette**: lets emulation colors to be remapped. See Chapter 7.1.3.

7.1.2 - Display Parameters

The following box is displayed:



These parameters are:

- **Resolution**: For information only. This is the resolution selected in the [Configuration]-[Terminal]-[Screen] menu.
- **Full Screen**: two possible values:
  - 'Yes': the session is displayed on the entire screen and the character size is automatically adapted to the resolution and the number of lines/columns.
  - 'No': the session is displayed in a 'Window' mode and the character size can be customized.
- **Character Size** (Only when 'Full Screen' is disabled): Two possible values: 'standard' (8x16) or 'double' (16x32).

Note: for more information, please refer to Appendix A.8.5.

7.1.3 - Customizing the 3270 Emulation

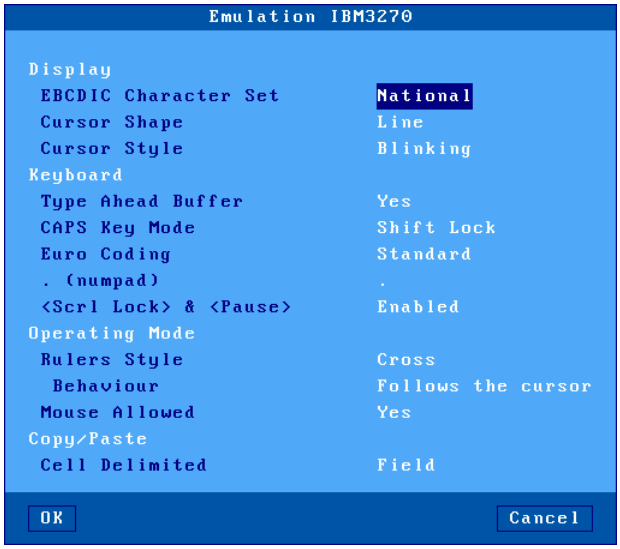
Various 3270 emulation parameters can be modified but generally the default values are the most suitable.

To customize the 3270 emulation, enter the AX3000 Set-Up and select the session profile (**[Configuration]-[Sessions]-[Session X]** menu). Three groups of parameters control 3270 emulation settings:

- Additional Parameters: 3270 emulation behavior,
- User-defined Sequences: mapping 3270 functions to any PC keyboard keys.
- Palette: remapping emulation colors.

a) 3270 Emulation Additional Parameters

The following box is displayed:



These parameters are:

- **Character Set**: the possible values are:
  - National (characters are keyboard nationality dependent),
  - Multinational.
  - A specific keyboard nationality (American, French…).
- **Cursor Shape**: Line, Half-Block or Block.
- **Cursor Style**: Blinking or Steady
- **Type Ahead Buffer**: enable/disable the keyboard buffer.
- **CAPS Key Mode**: set the CAPS LOCK to behave in either of two ways:
  - Caps Lock: only alphabetical keys are affected. To unlock this mode press the <CAPS> key.
  - Shift Lock: each key sends either the corresponding upper case letter or the shifted (upper) character. To unlock this mode press the <Shift> key.

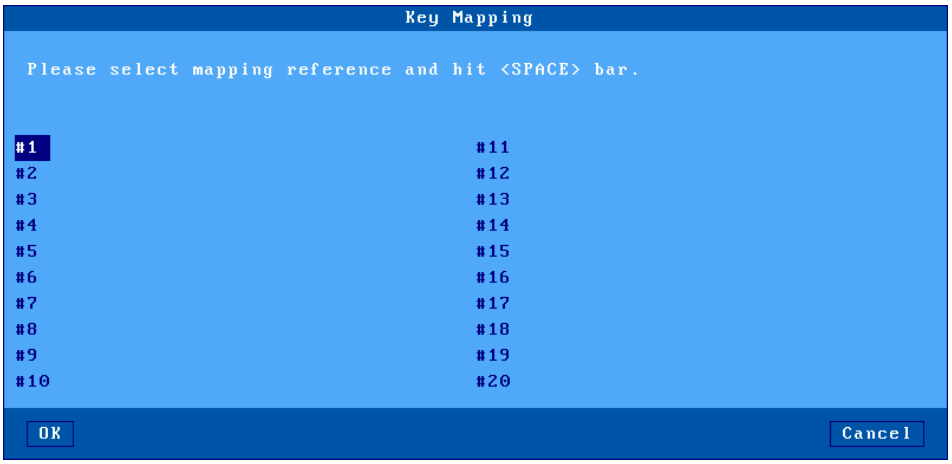
  - Uppercase: each key send the upper character if it is present. Otherwise, this is the lower character (upper-case letter if possible) which is sent. <Shift> key acts in the standard way (whatever the CAPS key). To unlock this mode press the <CAPS> key.
  - Caps Lock +: same as 'Shift Lock'. But in addition ALL the keys supported (including <Esc>, function keys...).
- **Euro Coding**: Euro symbol support. The three possible values are:
  - No: no specific processing is done
  - Standard: the Euro symbol replaces the international currency symbol '¤' within the current character set.
  - Custom: any character can be replaced by the Euro symbol within the current character set (use the decimal notation to enter the Euro EBCDIC code).
- **. (numpad)**: the two available values are the dot (.) and the comma (,).
- **<Scroll Lock> & <Pause>:** enable or disable these two keys
- **Rulers Style**: the "rule" function allows the cursor to be located easily among other characters. Three types of rules are available:
  - Cross: a horizontal line and a vertical line indicate the cursor location,
  - Horizontal: a horizontal line is displayed at the cursor line,
  - Vertical: a vertical line is displayed at the cursor column.

  Press <Rule> (or <Alt Gr><F12> with a PC keyboard) to enable/disable the rule function from a 3270 session.
- **Behavior**: the two values are: "follows the cursor" or "fixed"
- **Mouse Allowed**: enable/disable the mouse within this session
- **Cell Delimited**: Cut & Paste behavior.

b) Remapping 3270 Functions to any PC Keyboard keys

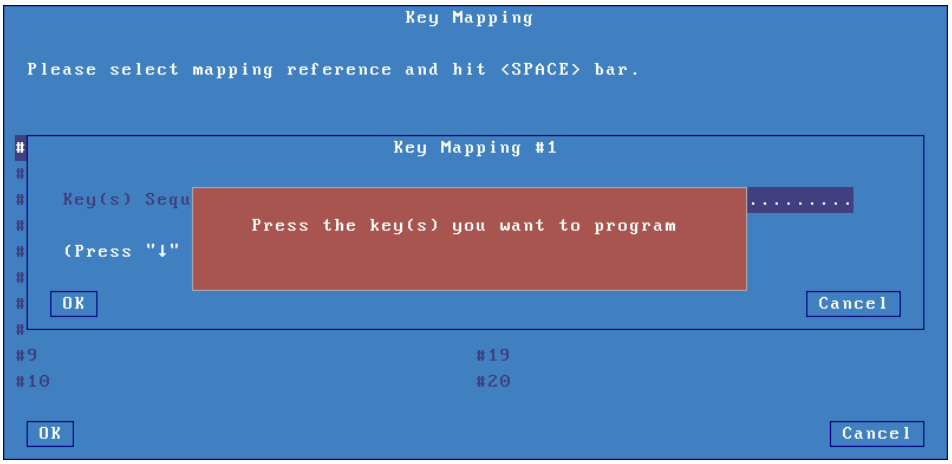
This allows any key to be remapped to any 3270 function and/or character string.

The following box is displayed:



Up to 20 sequences can be remapped (from #1 to #20).

To program a new sequence (or to modify an existing one) select the sequence number. The following dialog box is displayed:

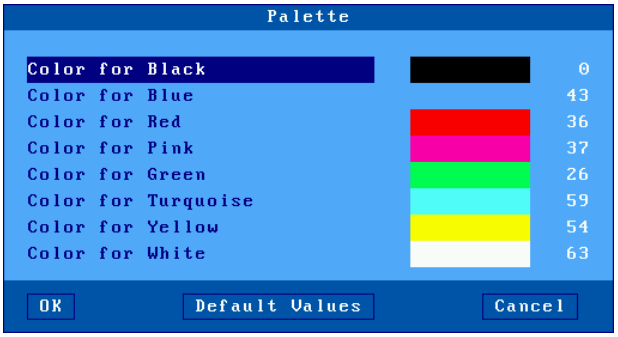


Enter the keystroke to be remapped. Then enter a character string and/or press <Down Arrow> to select through a list the associated 3270 function.

c) Palette

This allows default emulation colors to be remapped to any color.

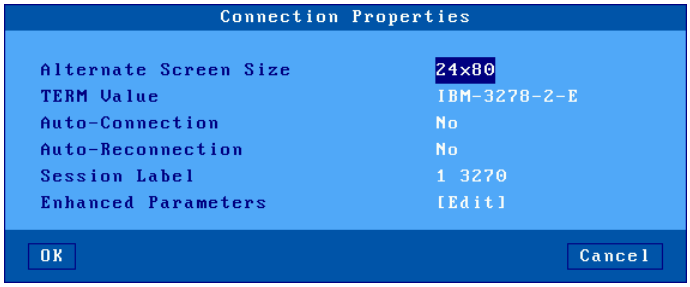
The following box is displayed:



Select one of the 8 emulation colors and associate it with another color.

7.1.4 - Connection Properties

The following box is displayed:



These parameters are:

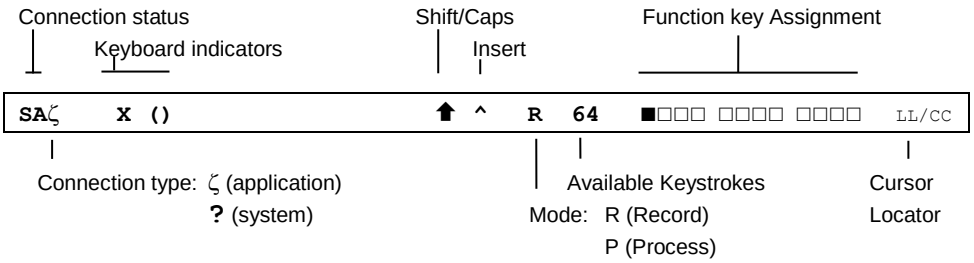
- **Alternate Screen Size**: possible values are 24x80, 32x80, 43x80 and 27x132. This value set-up a TERM default value.
- **TERM Value**: terminal capabilities. Default value is IBM-3278-2-E.
- **Auto-Connection**: if this parameter is set to 'yes', the connection will be automatically established when the AX3000 is powered. Otherwise, the user can press <Alt><Fx> to establish the connection.
- **Auto-Reconnection**: if this parameter is set to 'yes', a new connection is automatically established after a disconnection. Otherwise, the user can press <Alt><Fx> to establish a new connection.
- **Session Label**: this character string (11 characters max.) is used to identify the session within the local desktop or in the status bar.
- **Enhanced parameters**: see Appendix A.8.3.

7.2 - USING THE TERMIMAL

7.2.1 - The 3270 Status Line

Note: the 3270 status line is different than the AX3000 TCP/IP status line.

The 3270 status line is displayed at the bottom of the screen and gives the following information:



The status symbols are described in the following tables.

Connection Symbols

Symbol	Meaning
S	Connection with host is established
A	Connection is non-SNA
ζ	Connection to an application (Lu-Lu)
?	Connection to the system (not an application)

Keyboard Symbols

Symbol	Meaning
X ()	Keyboard is disabled
X	Only <Enter> is disabled
X >	Error: too much data entered. Press <Reset>
X NUM	Error: numeric value must be entered. Press <Reset>
X ← →	Error: invalid cursor position. Press <Reset>

Mode Symbols

Symbol	Meaning
⬆	<Shift> is currently pressed or the keyboard is in Caps Lock mode
^	The insert mode is enabled (<Inser> key)
R	The "Record" mode is set (see Chapter 6.2.3)
P	The "Process" mode is set (see Chapter 6.2.3)
LL/CC	LL and CC indicate the row and column where the cursor is located

7.2.2 - Using a PC/AT Keyboard (102/105 keys)

The IBM 3270 emulation enables a PC/AT keyboard to be used for operation as a 3270 terminal.

The first twelve 3270 function keys are accessed through <F1> to <F12>. The F13 to F24 function keys are accessed through <Shift><F1> to <Shift><F12>.

The following table lists the other useful keys:

3270 Functions	PC/AT keyboard
Fast cursor move to right	<Alt><right arrow>
Fast cursor move to left	<Alt><left arrow>
Backspace	<BackSP>
Tab	<Tab>
BackTab	<Shift><Tab>
Home	<Home>
Newline	<Enter>
EOF	<End>
Erase Input	<Alt><End>
Insert mode	<Inser>
Delete	<Del>
Duplicate	<Shift><Inser>
Field Mark	<Shift><Home>
System	<Alt><Syst> or <Shift><Esc>
Attention	<Alt><Pause> or <Esc>
Reset	<Ctrl left>
Clear	<Pause>
PA1	<PgUp>
PA2	<PgDn>
PA3	<Shift><PgUp>
PF1	<F1>
PF13	<Shift><F1> or <Esc>
Enter	<Right Ctrl> or <Num Entr>
<Record>	<Alt Gr><F4>
<Exec>	<Alt Gr><F5>
Euro Symbol	<Alt Gr><E>
Rule	<Alt Gr><F12>

7.2.3 - Programming Function Keys (Macro Feature)

The Axel 3270 emulation allows function keys to be programmed. For example a series of keystrokes can be recorded and played back by pressing a single key.

The recorded data is stored in non-volatile memory so is not affected by switching off.

Recorded keystrokes can be assigned to any of the twelve function keys (<F1> to <F12>).

a) Programming a Function Key

To record a series of keystrokes proceed as follows:

- Press **<Alt Gr><F4>** to set the record mode,
- Press any of the 12 function keys to which you want to assign,
- Type the key sequence you want to save,
- Press **<Alt Gr><F4>** to exit the record mode.

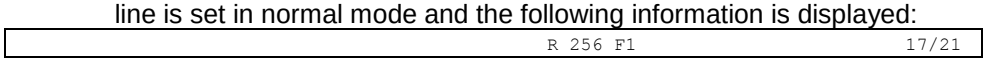
Notes:

- Memory usage: maximum 256 keystrokes recorded per function key.
- To delete a recorded function key, you have to record an empty key sequence.

Example:

1 - Press **<Alt Gr><F4>** to set the Record mode. The 3270 status line is set in reverse video mode and the following information is displayed (the 12 boxes are the 12 function keys, a solid box means that data is recorded):

2 - Press one of the function keys (from **<F1>** to **<F12>**). The 3270 status line is set in normal mode and the following information is displayed:



Note: 'R' indicates the Record mode. The second field is the maximum keystrokes that can be recorded for this session. The third field is the selected function key.

3 - Type the key sequence.

4 - To exit the Record mode, press **<Alt Gr><F4>**.

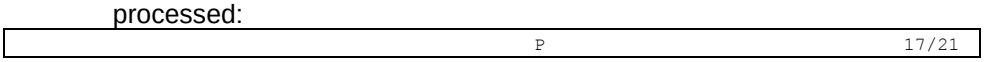
b) Processing a Key Sequence

To execute a series of keystrokes that have been recorded:
- Press **<Alt Gr><F5>** to set the Process mode,
- Press the recorded function key,
- The key sequence is processed.

Example:

1 - Press **<Alt Gr><F5>** to set the Process mode. The 3270 status line is set in reverse video mode and the following information is displayed (the 12 boxes are the 12 function keys, a solid box means that data is recorded):

2 - Press the recorded function key (from **<F1>** to **<F12>**). The 3270 status line is set in normal mode and the following information is displayed (the 'P' symbol indicates the Process mode). The key sequence is processed:



Note: during the process mode, the input is inhibited.

7.3 - 3270 PRINTER

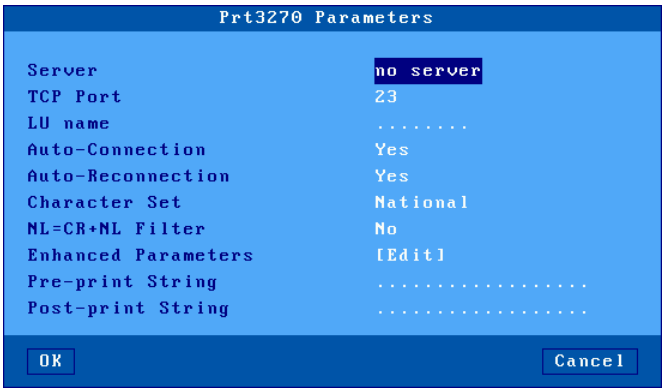
Auxiliary ports (2 serial and 1 parallel) and logical ports (USB and TCP) are provided by the AX3000. These ports are independently controlled so multiple printers can be attached to the AX3000.

These printers can be controlled by one of two protocols:
- **Prt3270**: a printer controlled by this service is seen as a standard spooled system printer device.
- **LPD**: this service (RFCs 1048 and related) is provided as a standard feature by major operating systems (Unix/Linux, NT, etc.). The main benefit of this protocol is an LPD printer can be shared by different operating systems.

This chapter describes only the Prt3270 protocol.

To set the Prt3270 service, enter the AX3000 Set-Up and select **[Configuration]-[Aux. Ports]-[xxx]**.

In the displayed box, set the "Associated Service" to "Prt3270", then select "Net Service Parameters". The following box is displayed:



These parameters are:

- **Server**: selected from the server table (see Chapter 3.1.4). A new server can be added by selecting 'IP address' or 'Server Name'.
- **TCP PORT**: telnet port of the S/390 server. Default is 23.
- **LU Name**: system printer name.
- **Auto-Connection**: set to yes.
- **Auto-Reconnection**: set to yes.
- **Character Set**: the possible values are:
    - National (characters are keyboard nationality dependent),
    - Multinational.
    - A specific keyboard nationality (American, French…).
- **NL=CR+NL Filter**: The line feed character (0Ah) can be mapped to carriage return + line feed (0Dh + 0Ah),
- **Enhanced parameters**: see Appendix A.8.3.
- **Pre-print String**: character string sent before the printing.
- **Post-print String**: character string sent after an the printing (for example "\0C" is a form feed)

Note 1: If "Choose Portrait/Landscape" is enabled (see Appendix A.10.2), the parameter "**Pre-print String**" is replaced by the two parameters "**Portrait Pre-**

print String" and "**Landscape Pre-print String**".

Note 2: if the auxiliary port used for printing is a serial port, set the 'Printer' operating mode and set the associated parameters (baud rate, handshake, etc).

7.4 - REMOTE ADMINISTRATION

A Windows administration utility (AxRM or Axel Remote Management) is available free on the Axel Web site. See Chapter 10.1.

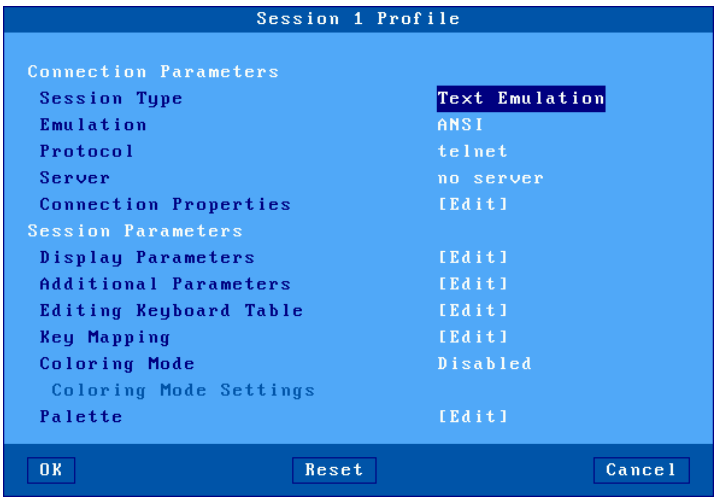
- 8 -
INSTALLING UNDER UNIX/LINUX

This chapter covers AX3000 installation under Unix/Linux.

8.1 - TEXT MODE SESSION (TCP/IP OR SERIAL MODE)

8.1.1 - Setting a Session Profile

To set the profile of a session, enter the AX3000 Set-Up and select the **[Configuration]-[Sessions]-[Session X]** menu (where X is the session number to be configured). The following box is displayed:



These parameters are:

- **Session Type**: select 'Text Emulations'.
- **Emulation**: see Chapter 8.1.3
- **Protocol**: select 'telnet', 'tty', 'ssh2' or 'serial'. (See Chapter 8.1.2)

- **Server**: selected from the server table (see Chapter 3.1.4). A new server can be added by selecting 'IP address' or 'Server Name'.
- **Connection Properties**: see Chapter 8.1.8
- **Display Parameters**: see Chapter 8.1.4.
- **Additional Parameters**: allows certain emulation parameters to be changed. (See Chapter 8.1.5)
- **Editing Keyboard table**: allows certain keys to be remapped. (See Chapter 8.1.5)
- **Key Mapping**: allows all of the keys to be remapped. (See Chapter 8.1.5)
- **Coloring mode**: allows monochrome applications to be displayed in color. (See Chapter 8.1.6)
- **Palette**: lets colors to be remapped. (See Chapter 8.1.5)

8.1.2 - Protocols: telnet, tty, ssh, ssh2 or aux1/aux2

Connecting a character based session can be done:
- Either in TCP/IP mode via **telnet**, **tty** or **ssh2** protocols
- Or in serial mode (RS232) by using a serial port (Aux1, Aux2...)

a) The TELNET Protocol

The telnet server is a standard module of the Unix/Linux TCP/IP stack. The AX3000 can immediately open a client telnet session, without any additional software or alteration to the Unix/Linux settings.

Main characteristics of a telnet session:
- Dynamic allocation of pseudo-terminals (ptty),
- System access is controlled by a 'login', which is generated by the telnetd daemon,
- The value of the TERM environment variable is negotiated after the login stage. (See Chapter 8.1.8 for default TERM values.)

b) The TTY Protocol

The tty server is an Axel proprietary protocol. Additional software is required (see Chapter 8.4).

Main characteristics of a tty session:

- Pre-defined allocation of pseudo-terminals (ptty),
- UNIX access is controlled by a 'login', which is generated by the init daemon (controlled by the **/etc/inittab** file).

The Unix/Linux host must run the AXEL tty server daemon (**axttyd**). The configuration file axttyd must contain a list of AX3000 sessions and the pttys associated with each.

Each session is identified by the name of the AX3000 (from the **/etc/hosts** file) and a special keyword (**sessx** where **x** is the session number). For example:

```
axel1      sess1      /dev/ptyp12      /dev/ttyp12
axel1      sess2      /dev/ptyp13      /dev/ttyp13
axel2      sess2      /dev/ptyp2       /dev/ttyp2
```

A terminal session controlled by the tty server acts as a serial terminal attached to a multi I/O board. The **/etc/inittab** file must therefore be modified to launch the **getty** command for each pseudo-terminal.

Example for SCO Unix: get a login on **/dev/ttyp12**:

```
p12:23:enable:/etc/getty -t60 /dev/ttyp2 m
```

This modification will take effect after invoking the following command:

```
# init q <CR>
```

For more information about the Axel tty server, refer to Chapter 8.4.

c) The SSH2 Protocol

An SSH connection can be considered as an encrypted telnet connection. Main characteristics are:

- Dynamic allocation of pseudo-terminals (ptty),
- System access is controlled by a 'login', which is generated by the sshd daemon (available with most versions of Unix/Linux),
- The value of the TERM environment variable is negotiated after the login stage. (See Chapter 8.1.8 for default TERM values.)

Note: the Axel SSH client is compliant with OpenSSH

d) Serial Ports (Aux1, Aux2…)

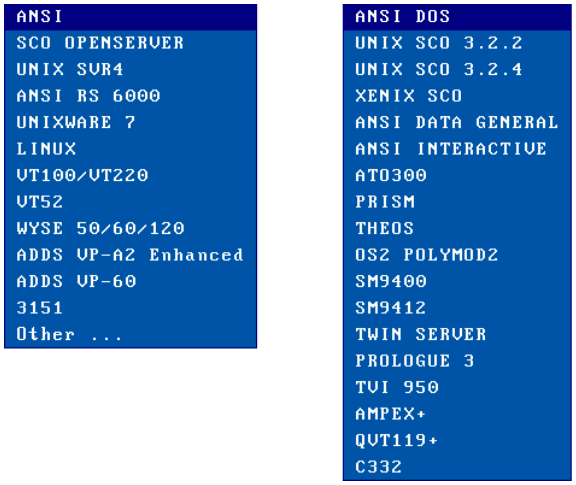
The Axel terminal supports both TCP/IP and serial (RS232) connections.

To establish a serial connection, the session 'Protocol' must be set to 'serial'. Then set 'Main Serial Port' to a native serial ports or an USB serial port.

The selected auxiliary port is set-up through the **[Configuration]-[Ports]-[xxx]-[yyy]** menu (see Chapter 3.5.1).

8.1.3 - Selecting the Emulation

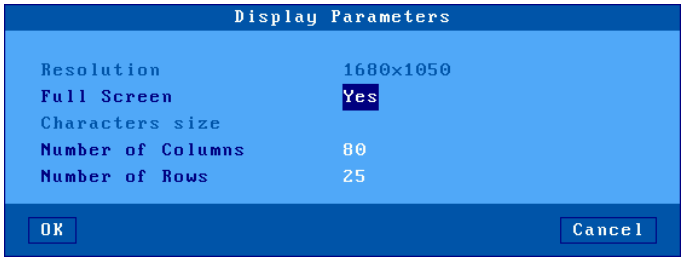
The available emulations are:



Note: selecting emulation sets the value of the TERM environment variable (see Chapter 8.1.8). This value can be modified later if necessary.

8.1.4 - Display Parameters

The following box is displayed:



These parameters are:

- **Resolution**: For information only. This is the current resolution selected in the [Configuration]-[Terminal]-[Screen] menu.
- **Full Screen**: two possible values:
  - 'Yes': the session is displayed on the entire screen and the character size is automatically adapted to the resolution and the number of lines/columns.
  - 'No': the session is displayed in a 'Window' mode and the character size can be customized.
- **Character Size** (Only when 'Full Screen' is disabled): Two possible values: 'standard' (8x16) or 'double' (16x32).
- **Number of Columns**: three possible values: 40, 80 or 132.
- **Number of Rows**: enter a value between 24 and 44.

Note: for more information, please refer to Appendix A.8.5.

8.1.5 - Customizing the Emulation

Various emulation parameters can be modified but generally the default values are the most suitable. Three groups of parameters control emulation settings:

- **Additional Parameters**: emulation behavior.
- **Editing Keyboard Table**: associating character strings to certain keyboard keys.
- **Key Mapping**: associating character strings to any keyboard keys.
- **Palette**: remapping emulation colors.

a) Emulation Additional Parameters

The following box is displayed:

These parameters are:

- **Character Set**: the available character sets depend on which emulation is selected.
- **Vertical Scrolling**: whether the AX3000 display scrolls, when the cursor is moved down passed the bottom of the screen:
  - Yes: the display scrolls up
  - No: the cursor re-appears on the first (top) line.
- **Wrap**: behavior of the AX3000 when the cursor reaches the last column of the screen:
  - Yes: the next characters wrap round onto the start of the next line
  - No: each new character overwrites the last character on the line.
- **CR=CR+LF**: AX3000 behavior when 0x0Dh is received:
  - Yes: 0x0D is mapped to 0x0D and 0x0A
  - No: no specific processing is done
- **Cursor Shape:** Line, Half-Block and Block.
- **Cursor Style:** Blinking or Steady.
- **Attributes Mode:** VGA monitor mode. The two values are "color" and "monochrome" (which allows underline attribute to be displayed).

- **Enhanced Mode**: enable or disable the display of double-size characters or color underline attribute.
- **Blink Allowed**: if blink attribute is disabled, 16 background colors can be used (instead of the 8 normally available).
- **Ignore Blank Atb** (WYSE emulation only): if 'yes', the blank attribute is not processed (example: normal+blank=normal).
- **End Sequence**: to stop transparent printing mode
- **Coding:** two keyboard modes are available (ASCII and scancode).
- **CAPS Key Mode**: set the CAPS LOCK to behave in either of three ways:
    - Caps Lock: each alphabetical key sends the corresponding upper case letter. To unlock this mode press the <CAPS> key.
    - Shift Lock: each key send the same character sent by pressing <Shift><This key>. To unlock this mode press a <Shift> key.
    - Uppercase: each key send the upper character if it is present. Otherwise, this is the lower character (upper-case letter if possible) which is sent. <Shift> key acts in the standard way (whatever the CAPS key). To unlock this mode press the <CAPS> key.
    - Caps Lock +: same as 'Shift Lock'. But in addition ALL the keys supported (including <Esc>, function keys...).
- **Composed Characters** : this parameter (only available in ASCII mode) sets the keyboard behavior for diacritical characters (for example: ^ + e = ê):
    - No: no specific processing is done
    - Local: composite characters are locally processed by the AX3000
    - Remote: SCO specific mode (mapchan).
- **Euro Coding**: this parameter is only available if the current character set is not PC858 or ISO8859-15 (These 2 character sets include the Euro symbol). The three values are:
    - No: no specific processing is done
    - Standard: the Euro symbol replaces the international currency symbol '¤' within the current character set.
    - Custom: any character can be replaced by the Euro symbol within the current character set (use the decimal notation to enter the Euro ASCII code).
- **<Scroll Lock> & <Pause>:** enable or disable these two keys
- **Tabulations:** a dialog box appears in which tab stops can be set.
- **Init String**: this character string is sent when the session (telnet or tty) is established.
- **Answer Back**: session identifier (10 character max.).

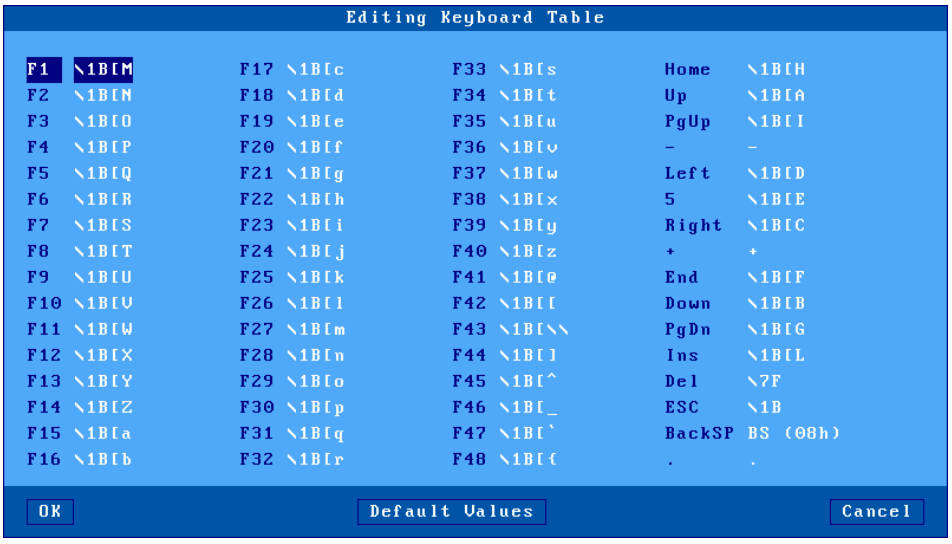
- **Monitor Mode**: the monitor mode is used to examine the data received by the AX3000:
  - No: monitor mode disabled.
  - Yes, hexadecimal value
  - Yes, symbol
- **Remote Terminal Set-Up**: enable or disable the use of escape sequences to set terminal parameters from the host computer.
- **Mouse Allowed**: enable/disable the mouse within this session.
- **Nulls Suppress** (WYSE emulation only): if 'yes', bytes with ASCII code set to zero are skipped.

b) Editing Keyboard Table

This dialog box allows certain keys to be remapped. This function is only available in keyboard ASCII mode.

Note: to remap keys not shown below use the "Key Mapping" function described in the next chapter.

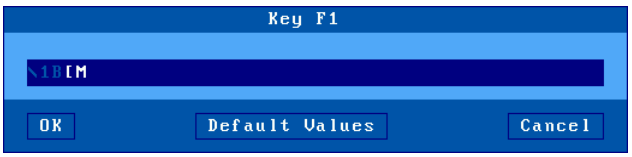
The following box is displayed:



There are three groups of programmable keys:

- From F1 to F48: function keys used singly or with a modifier key. Example for ANSI emulations:
  F1 to F12: <Fx> F13 to F24: <Shift><Fx
  F25 to F36: <Ctrl><Fx> F37 to F48: <Ctrl><Shift><Fx>
- Numeric pad with Number Lock off
- Special keys: Esc, Backspace and the ‘dot’ of the numeric pad.

To enter a programmable key value, select this key label. The following dialog box is displayed:



The main field is used to enter the programmable key value. ASCII codes lower than 20h can be entered as '\xx' (where xx is the hexadecimal value of the ASCII code).

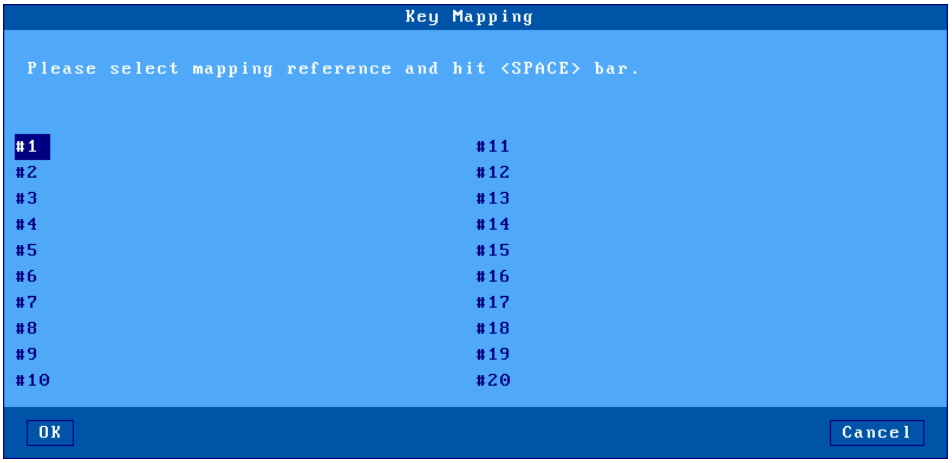
Note: for the 'Backspace' key and the numeric pad dot, a toggle is only available (two possible values for each key).

Memory usage is limited to 256 bytes maximum per key.

c) Key Mapping

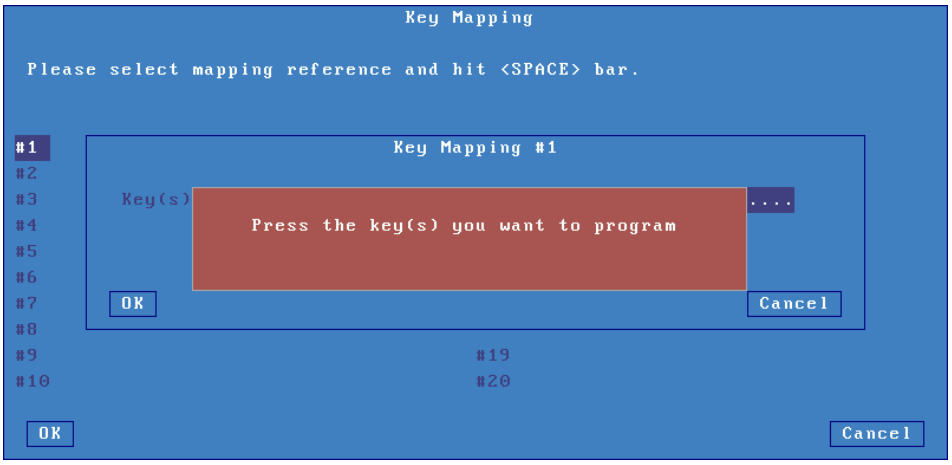
This function allows any key to be remapped into any value (only available for ASCII keyboard mode)

Select "Key Mapping" within the 'Session Profile' box and press <Space> to display the following box:

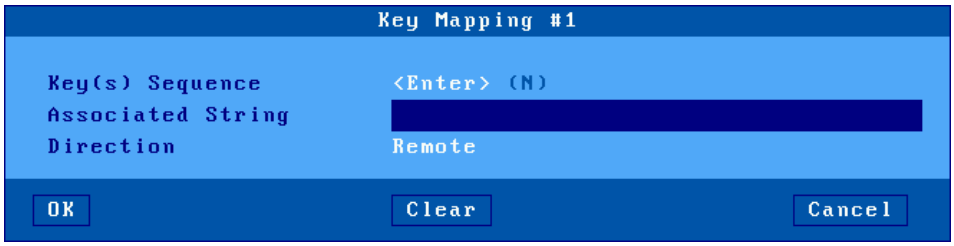


Up to 20 sequences can be remapped (from #1 to #20).

To program a new sequence (or to modify an existing one) select the sequence number. The following dialog box is displayed:



Press keystroke to be remapped). The following dialog box is displayed:



Other parameters:

- **Key(s) Sequence:** keystroke to be remapped
- **Associated String**: enter the value associated with the key sequence. ASCII codes lower than 20h can be entered as '\xx' (where xx is the hexadecimal value of the ASCII code).
- **Direction**: two possible values:
  - Remote: when the key sequence is pressed, the 'Associated String' is sent to the server.
  - Local: when the key sequence is pressed, the 'Associated String' is interpreted by the terminal (as if the string had been sent by the server).

d) Palette

This allows default emulation colors to be remapped to any color.

Within the 'Session Profile' box, select 'Palette'. The displayed box allows the 16 emulation colors to be remapped to another color.

8.1.6 - Coloring Mode

A background color, plus a foreground color for each monochrome character attribute or graphics character, may be set through the Coloring Mode. This function allows monochrome applications to be displayed in color.

The "**Coloring Mode**" parameter offers 2 values:

- Standard: 6 coloring attributes
- Enhanced: 16 coloring attributes

To customize the coloring mode, select the **"Coloring Mode Settings"** parameter. The displayed dialog box allows coloring attributes to be associated with a foreground and background colors.

8.1.7 - Underline Attribute Management

The reverse video attribute, the bold attribute and the blinking attribute are supported by all VGA monitors. However, the underline attribute is only supported by monochrome VGA monitors.

If the underline attribute is essential with a color VGA monitor, one of the following three methods can be used, but note that each entails the loss of some other display capability.

a) Using the Session as a Monochrome Session

Set the **Attribute Mode** parameter to **monochrome** (see Chapter 8.1.5).

b) Using the Coloring Mode

The AX3000 coloring mode is used to provide different foreground and background colors for each monochrome attribute. So although no underline appears on the screen, normal and underlined text can be distinguished by different background colors.

The benefit of this method is that the coloring mode is specific to a single session. Sessions with different colors, or with the native colors of a software package, can be run on the same AX3000.

For more information about "coloring mode", see Chapter 8.1.6.

c) Using Underline Attribute in Color Mode

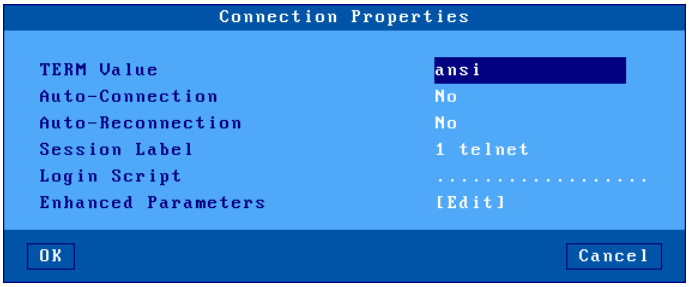
An AX3000 set-up parameter allows the underline attribute to be displayed in color mode, but this disables the bold attribute.

This is a good way to display underlining if the bold attribute is not used by the software in question.

Enter the AX3000 set-up and set for the required session the '**Enhanced Mode**' parameter to **'Yes'**. See Chapter 8.1.5.

8.1.8 - Connection Properties

The following box is displayed:



These parameters are:

- **TERM Value** (telnet and ssh2 protocols). The default TERM value depends on the selected emulation.
- **Auto-Connection**: if this parameter is set to 'yes', the connection will be automatically established when the AX3000 is powered. Otherwise, the user can press <Alt><Fx> to establish the connection.
- **Auto-Reconnection**: if this parameter is set to 'yes', a new connection is automatically established after a disconnection. Otherwise, the user can press <Alt><Fx> to establish a new connection.
- **Session Label**: this character string (11 characters max.) is used to identify the session within the local desktop or in the status bar.
- **Login Script**: a "login script" can be set to automatically enter user names and passwords at the login prompt. See Chapter 8.1.9.
- **Enhanced parameters**: see Appendix A.8.3.

8.1.9 - Login Script

The "login script" can be set to automatically enter user names and passwords at the login prompt.

a) Enabling a Login Script

To associate a login script with a session, within the 'Session Profile' box select "Connection Properties". In the displayed box (see Chapter 8.1.8) select "Login Script".

The login script is a character string with the following characteristics:

- Maximum 60 characters.
- The string is composed of tokens. The NULL character (encoded by \00) is used as a token-separator. A string must contain an even number of tokens.
- Any character except a NULL can compose a token.
- A string can contain as many tokens as needed.
- Odd tokens are characters expected by the AX3000.
- Even tokens are characters sent by the AX3000 after the expected token has been received.

A login script looks like:

```
aaaaaa\00bbbbbb\00cccccc\00dddddddd
```

b) Example

With the following script:

```
login:\00root\0D\00password:\00mypwd\0D
```

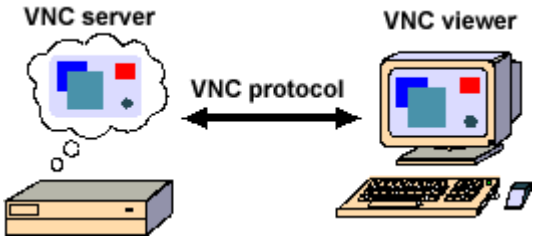
When the session is opened (<Alt><Fx>), the AX3000 acts as:

- Waiting for "login:".
- After "login:" has been received, the AX3000 sends "root"+<CR>. **Note**: as for the programmable keys, ASCII codes lower than 20h can be entered as '\xx' (where xx is the hexadecimal value of the ASCII code. Examples: Escape is \1B and <CR> is \0D.
- Waiting for "password:".
- After "password:" has been received, the AX3000 sends "mypwd"+<CR>.

Note: whilst a login script is running, the AX3000 keyboard is locked. In the event of a problem (wrong expected token), press <Esc> to skip the login script and to unlock the keyboard.

8.2 - GRAPHICAL MODE SESSION (VNC)

The VNC protocol enables a remote graphical display on the Axel-VNCviewer. The image is constructed, maintained and updated within the Unix server's frame buffer, and transmitted across the TCP/IP network.

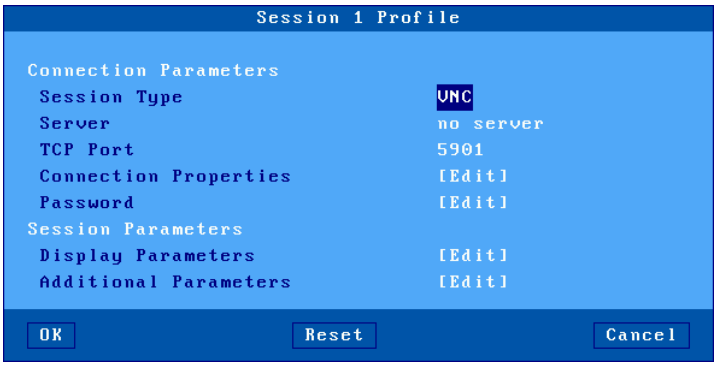


Note: this protocol is public and the associated software is free. For more information please see http://www.realvnc.com/

The following is a summary of the VNC terminal declaration. For more information, please consult "*AxGVNC - Configuring VNC Terminals under Linux*"

8.2.1 - Setting-Up a VNC Session

To set-up a VNC session, select **[Configuration]-[Sessions]-[Session X]** (where X is the session number). The following dialog box is displayed:

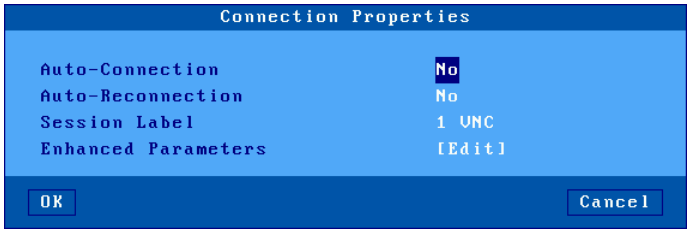


Set the following parameters:

- **Session Type**: select 'VNC'
- **Server**: selected from the server table (see Chapter 3.1.4). A new server can be added by selecting 'IP address' or 'Server Name'.
- **TCP Port**: numeric value associated with the display (see Chapter 8.2.2).
- **Connection Properties**: see sub-section a.
- **Password**: this allows the optional VNC connection password to be stored (Note: this is the VNC password - not the user password).
- **Display Parameters**: see sub-section b.
- **Additional Parameters**: lets certain VNC parameters to be changed. See sub-section c.

a) Connection Properties

The following box is displayed:

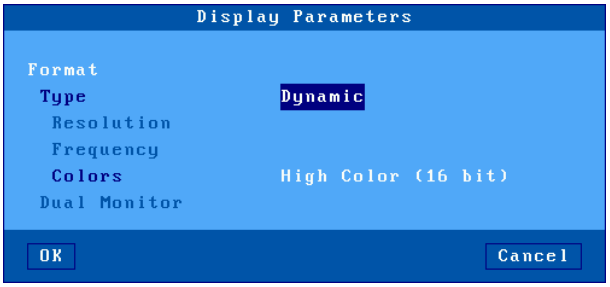


These parameters are:

- **Auto-Connection**: if this parameter is set to 'yes', the connection will be automatically established when the AX3000 is powered. Otherwise, the user can press <Alt><Fx> to establish the connection.
- **Auto-Reconnection**: if this parameter is set to 'yes', a new connection is automatically established after a disconnection. Otherwise, the user can press <Alt><Fx> to establish a new connection.
- **Session Label**: this character string (11 characters max.) is used to identify the session within the local desktop or in the status bar.
- **Enhanced parameters**: see Appendix A.8.3.

b) Display Parameters

The following box is displayed:



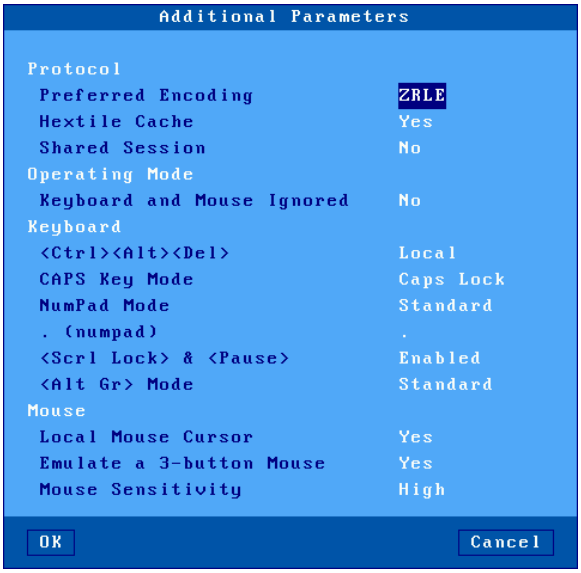
This box allows display settings (resolution, number of colors and frequency) to be set. The availability of these parameters depends of the **Type** value:

- **Dynamic**: The Resolution is given by the Xvnc server when the session is established. If supported, it's accepted by the terminal. Else default value (from general level) is used.
- **Default**: the three parameters (resolution, colors and frequency) are issued from general settings (see Chapter 3.2.2). When general settings are modified, these three parameters are automatically updated with new values.
- **Customized**: the three parameters are independent from general settings.

Note: the "Dual Monitor" option is always disabled.

c) Additional Parameters

The following box is displayed:



These parameters are:

- **Preferred Encoding**: the 'encoding' is the data format used by the VNC server to send graphical data to the terminal. Supported encodings are:
  - Hextile: original encoding supported by all VNC server versions.
  - ZRLE: newer and higher performing encoding but is only supported by a RealVNC server V4. In addition, ZRLE graphical data may be compressed.
- **Hextile Cache**: when this parameter is disabled, display updates are directly done on the screen itself. Else a display update is first built in memory and then displayed. The global performance is the same whatever the method. But the terminal is more comfortable to be used when the 'Cache Hextile' is enabled.
- **Shared Session**: this allows multiple VNC terminals to share the same graphical display (i.e. the same server frame buffer).

- **Keyboard and Mouse Ignored**: if 'yes' all parameters related to mouse and keyboard are disabled. The terminal no longer sends mouse/keyboard event to the VNC server.
- **<Ctrl><Alt><Del>**: there are two modes for this keystroke:
    - Local: the keystroke is handled by the AX3000 and is used to shutdown the terminal (see Chapter 4.8)
    - Remote: the keystroke is handled by the VNC server.
- **CAPS Key Mode**: set the CAPS LOCK to behave in either of three ways:
    - Caps Lock: each alphabetical key sends the corresponding upper case letter. To unlock this mode press the <CAPS> key.
    - Shift Lock: each key send the same character sent by pressing <Shift><This key>. To unlock this mode press a <Shift> key.
    - Uppercase: each key send the upper character if it is present. Otherwise, this is the lower character (upper-case letter if possible) which is sent. <Shift> key acts in the standard way (whatever the CAPS key). To unlock this mode press the <CAPS> key.
    - Caps Lock +: same as 'Shift Lock'. But in addition ALL the keys supported (including <Esc>, function keys...).
- **Numpad Mode**: this parameter sets the type of keyboard event sent when pressing a key of the numpad:
    - Standard: keyboard events are thus defined by the RFB protocol.
    - ASCII: keyboard events are the same than the top row keys (above QWERTY). With this mode an application can't distinguish is the pressed key belong or not to the numpad. This mode may be required for some JAVE-based applications.
- **. (numpad)**: the two available values are the dot (.) and the comma (,).
- **<Scroll Lock> & <Pause>:** enable or disable these two keys
- **<Alt Gr> Mode:** this parameter sets the type of keyboard event sent when pressing <Alt Gr> (located at the right of the space bar:
    - Standard: the keyboard event is AltGr.
    - Ctrl+Alt: the keyboard events are <Ctrl> and <Alt> (left of the space bar).
- **Local Mouse Cursor**: if 'no', the mouse cursor is fully handled by the VNC server. If 'yes', the behavior depends on the VNC server version:
    - Xvnc V3: as above the mouse cursor is handled by Xvnc. In addition the local mouse cursor location is indicated by a little square pointer (2x2 pixels). This can be useful when the local mouse cursor location is different from the VNC cursor location (for example when the Unix/Linux server or the network is overloaded).

  - Xvnc V4: the mouse cursor is handled by the AX3000. With a low-bandwidth, this allows the mouse cursor to be more reactive.
- **Emulate a 3-button Mouse**: if 'yes', the mouse middle button is emulated by clicking both left and right buttons.
- **Mouse Sensitivity**: This setting varies the sample rate of the mouse. If the sensitivity is increased the mouse movement will be more fluid, but also network activity is increased.

8.2.2 - Configuring VNC on the Unix/Linux Server

Axel provides software for configuring VNC terminals under Linux: **AxGVNC**.

AxGVNC checks the Linux configuration and allows, if needed, some system modifications to be automatically done.

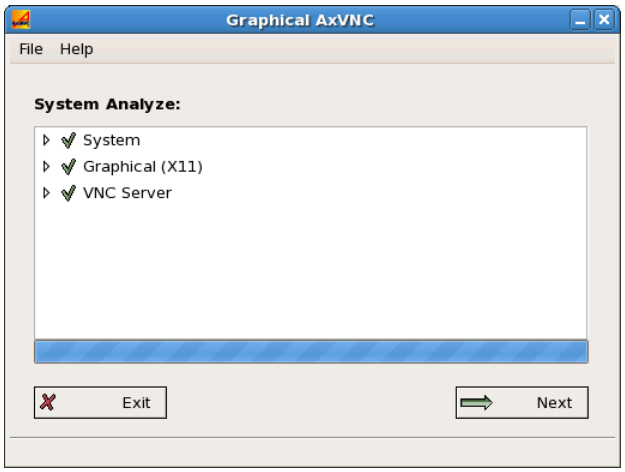
a) Installing AxGVNC

Use 'gzip' and 'tar' command to extract files from AxGVNC.tar.gz.

Copy the AxGVNC binary file and the languages files (*.lng) in your preferred folder.

b) Analyzing Linux

After being launched AxGVNC automatically checks the Linux settings and allows (or not) VNC terminals to be configured:

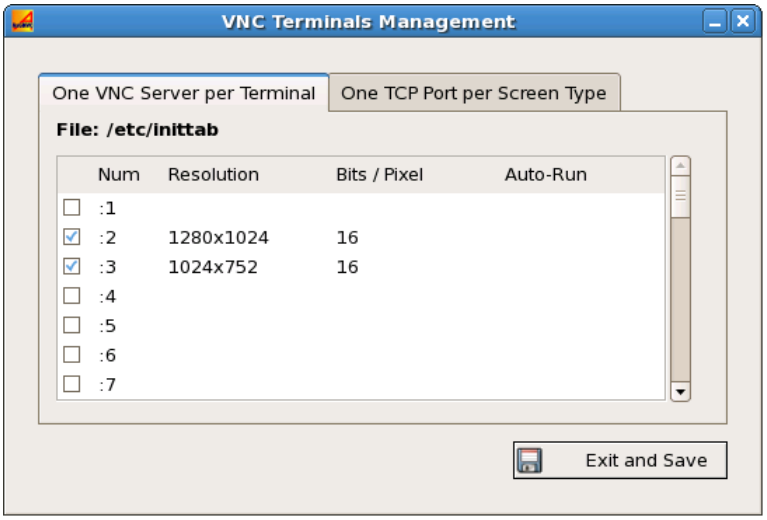


Problems are indicated by red indicators and an attempt to rectify is made by double clicking.

When all indicators are green, click the **[Next]** button.

c) Configuring VNC Terminals

The following dialog box is displayed:



Two methods are available:

- **One VNC Server per Terminal**: when Linux is started, one Xvnc daemon per terminal is run. Each terminal will establish a connection to 'its' Xvnc daemon (identified by a different TCP port).
  The main benefit is after an incident (network or other), the terminal will retrieve the lost session.
  In addition with this method, the logon screen may be skipped and replaced by any application (Firefox for example).
- **One TCP Port per Screen Type**: an Xvnc daemon is run only when a VNC terminal opens a connection. The TCP port depends on both the resolution and the number of colors.
  This mechanism is similar to telnet or SSH: all terminals can use the same TCP port but in event of problem the lost session can't be retrieved.
  The benefit is saving resources: the number of running Xvnc daemons is the number of terminals currently in use.

Note: the two methods may be hosted on the same Linux server.

Click the tab corresponding to the preferred method and add VNC terminals. (The Linux server will be rebooted for modifications take effect)

8.3 - CONTROLLING PRINTERS

Auxiliary ports (2 serial and 1 parallel), logical USB ports and network printer ports are provided by the AX3000. These ports are independently controlled so multiple printers can be attached to the AX3000.

A printer is generally controlled by a network service:

- **tty protocol**: this is an Axel proprietary protocol. A printer controlled by the tty protocol is seen as a local printer.
- **LPD protocol**: this service (RFCs 1048 and related) is provided as a standard feature by major operating systems (Unix/Linux, Windows, etc.). The main benefit of this protocol is an LPD printer can be shared by different operating systems.
- **rsh command**: this command allows the contents of a file to be redirected over the network.

In addition, a printer can also be controlled in "transparent mode" (by embedded escape sequences, like a printer attached to a serial terminal).

The following covers the tty protocol, the rsh command and the transparent mode. For more information about LPD printers, refer to Appendix A.3.

8.3.1 - The tty Protocol

The tty server is an Axel proprietary protocol. An additional piece of software is needed (see Chapter 8.4).

The Unix/Linux host must run the AXEL tty server daemon (`axttyd`). The configuration file `axttyd` must contain a list of AX3000 auxiliary ports and the pttys associated with each.

Each auxiliary port using the tty protocol (see Chapter 3.5.4) is identified by the name of the AX3000 (from the `/etc/hosts` file) and a special keyword. For example:

```
axel1     aux1       /dev/ptyp12     /dev/ttyp12
axel1     aux2       /dev/ptyp13     /dev/ttyp13
axel2     parallel   /dev/ptyp2      /dev/ttyp2
```

An auxiliary port controlled by the tty server is seen as a Unix/Linux local port (like a multi I/O board).

Data can be sent to an auxiliary port by:
- Either a redirection to the ttyp (example: "cat file > /dev/ttyp12")
- Or declaring a local printer attached to the ttyp (/dev/ttyp12). This printer is used through the lp command.

8.3.2 - The LPD Protocol

Set the auxiliary port as shown in Chapter 3.5.2.

Use the appropriate UNIX system management tool to add a remote printer. At least, two parameters are requested:
- The name of the remote host: enter the AX3000's hostname (refer to **/etc/hosts**),
- The name of the printer: this is the **Printer Port Name** entered when the AX3000 was set up.

Run the **lp** command to use this printer.

Note: some options of the **lp** command (number of copies, banner, etc) cannot be used, because the AX3000 is not a UNIX server and has no hard disk on which to run a spooler.

8.3.3 - The rsh Command

The rsh command (or rcmd on SCO OpenServer) can be used to print a file.

The rsh parameters are:
- The hostname or the IP address of the device,
- A keyword which is the AX3000 auxiliary port name. This name has been set through the AX3000 Set-Up (see Chapter 3.5.6).

To print a file, the rsh command reads data from 'standard input' (`stdin`) and sends this data to one of the AX3000's auxiliary ports. For example:

```
$ rsh axname parallel < file <CR>
```

In this example, `axname` is the name of the AX3000 (refer to `/etc/hosts` file) and `parallel` is the Printer Port Name of the AX3000 auxiliary port.

8.3.4 - Using Transparent Mode

One of the auxiliary or logical ports should be selected as the default printer port which will be controlled by escape sequences.

Select the **[Configuration]-[Terminal]-[Miscellaneous]** dialog and set the 'default printer port'.

This default port can only be used if no network service (lpd, tty, etc) is currently using it.

Note: the default printer port is also used to perform local printing of the screen using the **<Prt Scr>** key.

8.4 - THE AXEL TTY SERVER

8.4.1 - Overview

The TTY server emulates a multi i/o board connection over a TCP/IP connection. For example using this service a remote printer attached to an Axel terminal is accessed by Unix as a local printer via /dev/ttyp4, which may be preferable over using LPD in certain circumstances. Similarly the Axel terminal can be accessed via a predetermined and fixed /dev/ttyp, which in certain cases may be preferable over using telnet.

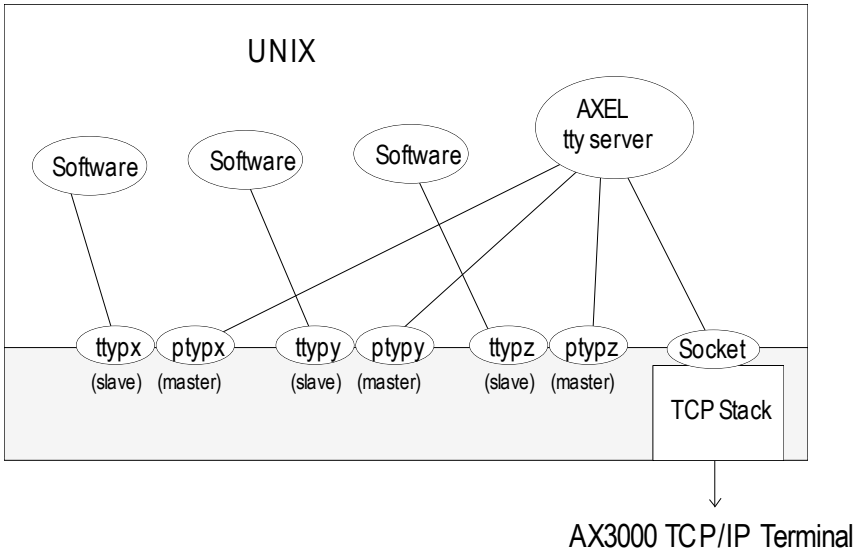
The AXEL tty server is a UNIX daemon (axttyd). The axttyd daemon must be used with the AX3000 **tty** or **rtty** network service.

The AXEL tty server creates a 'pipe' between pseudo devices on the UNIX host (/dev/ttypx) and AX3000 resources (sessions and/or auxiliary ports). This 'pipe' lets Unix treat the Axel sessions and auxiliary ports as local resources.

Note about pseudo-terminals: a pseudo-terminal is composed of two parts: a master file and a slave file. UNIX supports two possible styles for naming pttys:

- One master and X slaves (AT&T style): the master filename is **/dev/ptmx** and the slave filenames are **/dev/pts/xxx** (where **xxx** is a number).
- X masters and X slaves (Berkeley style): the master filename is **/dev/ptypxxx** and the slave filenames are **/dev/ttypxxx** (where **xxx** is the same number for master and slave).

The following drawing shows the Unix/Linux mechanisms:



8.4.2 - Installing an AXEL tty server

Copy to **/etc** and rename as **axttyd** the appropriate binary. Example for IBM AIX:

```
# cp axttyd.AIX /etc/axttyd <CR>
```

Note: the source file and the **makefile** are also provided. If the binary file required for your operating system is not provided, it can be generated.

Copy the AXEL association file (**axfile**) into the **/etc** directory:

To launch the AXEL tty server automatically, whenever the host is booted, copy into the boot directory the **S91axel** file (for Unix) or the **S91axtty** file (for Linux).

The **S91axel** or **S91axtty** files launch the AXEL tty server. If parameters other than the default are required, this command line can be edited.

8.4.3 - Using an AXEL tty server

a) Overview

The AXEL tty server uses a configuration file which lists all authorized associations between AX3000 resources and UNIX pttys. Each entry in this file contains four parameters:

- AX3000 hostname (see **/etc/hosts**)
- The AX3000 resource, which depends on which network service is used:
  - tty on terminal session: **sess1** to **sess6**
  - tty on auxiliary port: **aux1**, **aux2** and **parallel**,
  - tty on logical USB port: **usb1** to **usb4**,
  - tty on logical TCP port: **net1** to **net4**,
  - rtty: encoded by a TCP port
- The master file of the ptty (/dev/ptty or /dev/ptmx)
- The slave file of the ptty (/dev/ttyp, /dev/pts/xxx or a link file automatically created by axttyd).

For example:

```
#AX3000    Resource     Master         Slave
axel1      aux1         /dev/ptyp12    /dev/ttyp12
axel1      aux2         /dev/ptmx      /dev/pts/13
axel2      2050         /dev/ptyp0     /dev/ttyp0
axel2      sess1        /dev/ptmx      /dev/axel
axel2      sess2        /dev/ptyp2     /dev/ttyp2
```

Notes:

- Lines beginning with '#' are ignored.
- Association lines 1, 2, 4 and 5 use the tty service, and association line 3 uses rtty service.
- Association line 4 uses a link file (/dev/axel). This file is linked with an undefined slave ttyp (/dev/pts/xxx). This link file is automatically created when axttyd is run.

Errors (syntax error, unknown AX3000 hostname, ptty not available, etc) are recorded in a log file.

b) Running the Axel Tty Server

The command to start the AXEL tty server is:

```
/etc/axttyd [-f file] [-l log] [-n port] [-hbFUk] &
```

- `-b`: use a buffer for received data.
- `-f`: configuration file (default: `/etc/axfile`).
- `-F`: ttyp buffers are flushed when the tty connection is established.
- `-h`: on-line help.
- `-l`: log file (default: `/tmp/axttylog`).
- `-n`: TCP port (default: 2048) for connections using the tty service.
- `-U`: only unidirectional dataflow is supported. Data from the network is dropped.
- `-k`: turn-off keepalive function.

Note: take care to add the '`&`' character at the end of line.

The AXEL tty server can be started either from the UNIX command line or at boot time (from **S91axel** or **S91axtty**).

All authorized associations, connections and disconnections will be recorded in the specified log file.

8.4.4 - The axttyd Mechanism

The axttyd daemon performs the following steps:

- **init stage**: association file checking (errors are reported in the log file) and associated ptty opening (masters and slaves),
- **rtty stage**: for each rtty association, a child process is created. Each child process listens on the associated ptty. When data is received a socket is opened on the AX3000 auxiliary port. Bi-directional communication is then enabled. If no data is sent or received for any one minute interval, the connection is closed. It will be opened again, the next time data is received from the ptty.
- **tty stage**: when all the rtty child processes are created, the axttyd daemon listens on the TCP/IP socket (generally 2048). For each connection request (from an AX3000 tty service), a child process is created. This process controls communication between the ptty and the AX3000 resource (session or auxiliary port).

8.4.5 - Uninstalling

Remove the AXEL files and kill the AXEL tty server process (signal TERM):

```
# kill -TERM pid<CR>
```

where `pid` is the process ID of the AXEL tty server.

8.4.6 - In Event of Problems...

In event of difficulties please consult the logfile (/tmp/axttylog) and to read the last messages.

a) Message "Can not bind TCP port"

The message indicates the axtty TCP port (2048 by default) is currently in use. This port must be released.

b) Message "Waiting for connections from TCP/IP socket"

Initialization is correct and completed. The Axel tty server is now waiting for incoming connections. Check terminal settings (specially the tty auto-connection parameter). Possibly a firewall is blocking communication from the terminal to the server.

8.5 - REMOTE ADMINISTRATION

8.5.1 - AxRM Software

Axel's Windows administration utility (AxRM or Axel Remote Management) is available free on the Axel Web site. See Chapter 10.1.

8.5.2 - Using Unix/Linux Commands

The rsh command can be used to run remote commands (get set-up, reboot…) onto the terminal. Available administration commands are described in Appendix A.7.

In addition, a telnet server is embedded on the Axel terminal. This allows the terminal Set-Up remote control.

- 9 -
TOOLS AND STATISTICS

This chapter describes the embedded AX3000 tools.

The AX3000 interactive set-up provides the following administration features:

- Using a memory stick to transfer a configuration file
- Updating the terminal firmware (memstick or network)
- Ping command
- Connection management
- Interface information
- USB device list

9.1 - HANDLING A CONFIGURATION FILE WITH A MEMSTICK

A configuration file is a text file. It can list some or all AX3000 set-up parameters.

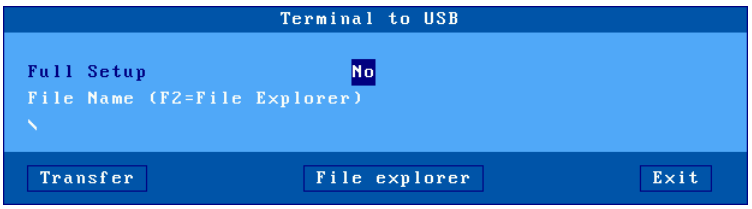
For more information about the configuration file format, see the Chapter 10.4.2.

The configuration file management can also be done remotely. See Chapter 10.

9.1.1 - Obtaining and Storing the Configuration File

The configuration file can be obtained from a pre-configured.

Select the **[Upgrade]-[Config File]-[Terminal to USB]** menu from the AX3000 set-up. The following box is displayed:



When '**Full Set-Up**' option is selected, all non-used terminal parameters will be included (as comments) in the configuration file.

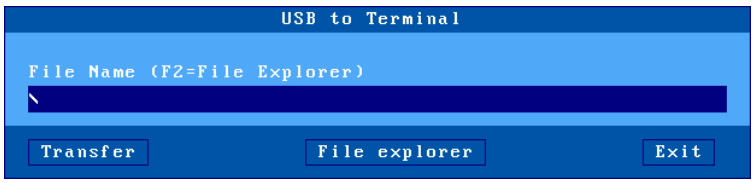
The configuration filename can be manually entered or located with the [File Explorer] button.

Click the [Transfer] button to launch the operation.

9.1.2 - Send a Configuration File to the Terminal

A configuration file can be sent to the terminal.

Select the **[Upgrade]-[Config File]-[USB to Terminal]** menu from the AX3000 set-up. The following box is displayed:



The configuration filename can be manually entered or located with the [File Explorer] button.

Click the [Transfer] button to launch the operation.

IMPORTANT: the terminal will automatically reboot after this operation.

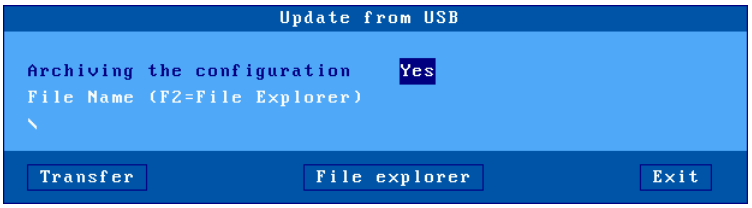
9.2 - UPDATING THE FIRMWARE

The terminal firmware can be updated. This can be done:
- Remotely with the AxRM software. See Chapter 10.
- From a USB memstick.
- With the bootp/tftp protocol.

All Axel products have an 'FK' (Firmware key) number. **It is important that the firmware file and Axel hardware have the same FK number**. If not the update will fail.

9.2.1 - From a MemStick

Select the **[Upgrade]-[Firmware]-[Update from USB]** menu from the AX3000 set-up. The following box is displayed:



When '**Archiving the configuration**' option is selected, before the firmware upgrade, the configuration file will be stored at the memstick root (the filename is the terminal MAC address).

The firmware filename can be manually entered or located with the [File Explorer] button.

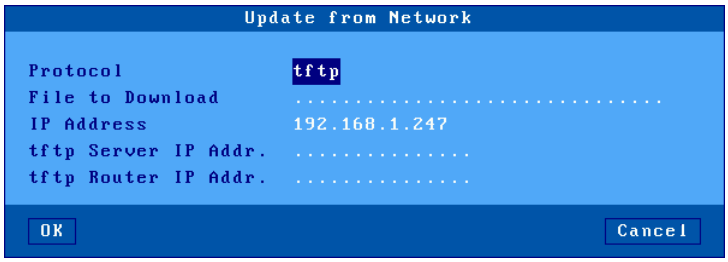
Click the [Transfer] button to launch the operation.

IMPORTANT: the terminal will automatically reboot after this operation.

The configuration is not sent automatically to the terminal after the firmware update.

9.2.1 - With bootp/tftp Protocols

Select the **[Upgrade]-[Firmware]-[Update from Network]** menu from the AX3000 set-up. The following box is displayed:



Firmware can be updated in one of two ways:

- **tftp** protocol: the operator must enter the location of the firmware file.
- **bootp and tftp** protocol: this is an automatic procedure. The necessary parameters will already be available from a bootp server.
  Note: AxRM can act as a bootp/tftp server

IMPORTANT: the terminal will automatically reboot to perform this operation.

9.3 - THE PING COMMAND

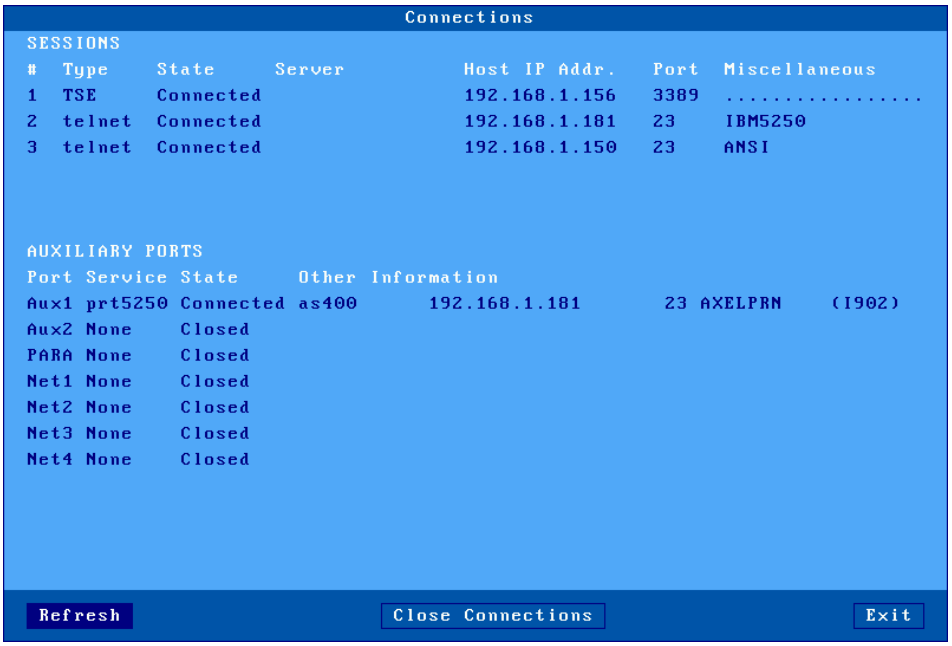
The ping command is used to check for the presence of a live TPC/IP device. Select the **[Diagnostics]-[Ping]** dialog from the AX3000 set-up, then select the server name from the list or enter the IP address or the DNS name of the server.

9.4 - CONNECTION MANAGEMENT

Connection failures are often caused by incorrect settings.

9.4.1 - Global Connection List.

Select the **[Diagnostics]-[Connections]** dialog to check the status of all defined connections:



Note: 'outside' the set-up, use <Ctrl><Alt><X> displays this box.

For each session, the following information is displayed:

- **No**: session number.
- **Type**: main values are TSE, ica, telnet, tty, vnc...
- **State**: the possible values are:
  - Established: the session is connected,
  - Closed: the session has ended,
  - Syn sent: connection request in progress,
- **Time Wait**: connection close in progress.
- **Server** and **IP Addr Host**: the associated host.
- **Port**: the TCP port used for the session (this is usually 23 for telnet, 2048 for tty and 59xx for vnc).

- **Configuration**: the associated pre-defined configuration.

For each auxiliary port, the following information is displayed:
- **Port**: the name of the port: Aux1, Aux2, PARA (parallel), Usb1, ..., Usb4, Net1 and Net2
- **Service** and **Other**: information about the associated network service:
  - lpd: printer port name and optional filter,
  - rcmd: printer port name,
  - telnet: associated host, TCP port, TERM and connection flags,
  - tty: associated host, TCP port and connection flag,
  - prt5250: associated host, TCP port, printer name and AS/400 connection status,
  - printd or rtty: TCP port and optional filter.
- **State**: see above for the possible values.

A connection can be manually closed by selecting the `[CLOSE CONNECTION]` button.

Note: to refresh the information displayed, select the `[REFRESH]` button.

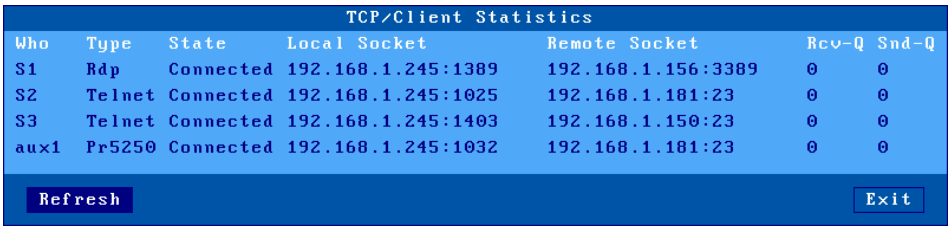
9.4.2 - "TCP Server" and "TCP Client" Connection Information

To go further with connection information, two additional statistics dialog boxes are available:
- **TCP server**: contains information about connections where the AX3000 is acting as a server (lpd, rtty and rcmd).
- **TCP client**: contains information about connections where the AX3000 is acting as a client (telnet, tty, rdp, ica and vnc).

These statistics show the following:
- Information about connections
- Values of counters

These dialog boxes are accessed by the **[Diagnostics]-[Statistics]-[TCP xxx]-[yyy]** menu.

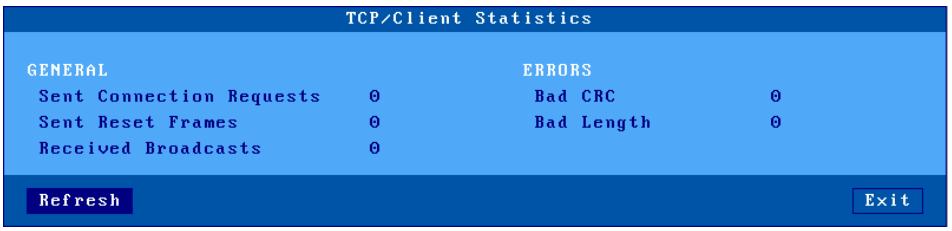
Example of a TCP client connection box:


TCP/Client Statistics
Who Type State Local Socket Remote Socket Rcv-Q Snd-Q
S1 Rdp Connected 192.168.1.245:1389 192.168.1.156:3389 0 0
S2 Telnet Connected 192.168.1.245:1025 192.168.1.181:23 0 0
S3 Telnet Connected 192.168.1.245:1403 192.168.1.150:23 0 0
aux1 Pr5250 Connected 192.168.1.245:1032 192.168.1.181:23 0 0
Refresh
Exit

Description of the information given within this box:

- **Who**: AX3000 resource involved in the connection: S1 (session 1), ..., S8 (session 8), Aux1, Aux2, PARA (parallel), Usb1, ..., Usb4, Net1 and Net2.
- **Type**: network service being used (telnet, tty, etc).
- **State**: the possible values are:
  - Established: the session is connected,
  - Closed: the session has ended,
  - Syn sent: connection request in progress,
  - Time Wait: connection close in progress.
- **Local Socket**: IP address and TCP port for the AX3000.
- **Remote Socket**: IP address and TCP port for the host.
- **Rcv-Q**: number of bytes received by the AX3000 and not yet processed
- **Snd-Q**: number of bytes not yet sent to the host

Example of a counter box:

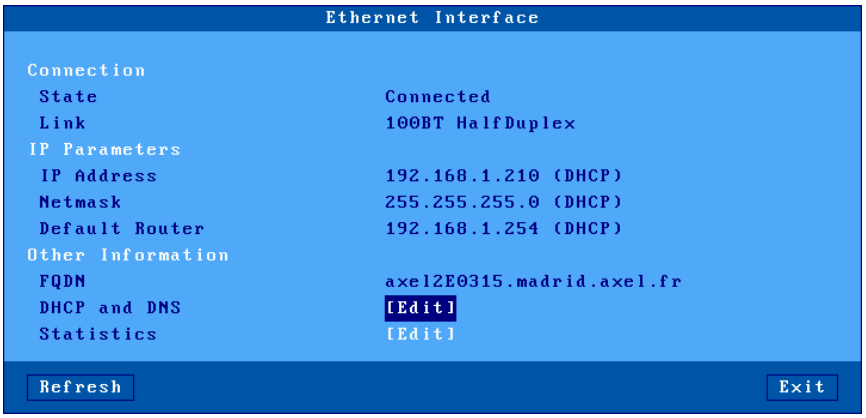


9.5 - ETHERNET INTERFACE INFORMATION

9.5.1 - Ethernet Interface

a) State

The following information is displayed when selecting the **[Configuration]-[Network]-[Ethernet Interface]-[State]** menu:



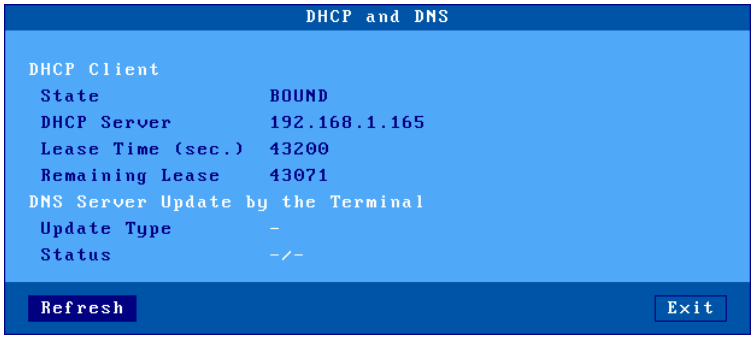
Note: this information is automatically updated every 5 seconds. To force an update use the [Refresh] button.

In the above dialog box, the following information is given:

- **Link**: speed and type the network interface (useful when set in auto-sense mode).
- **IP parameters**: IP address, netmask and default router
- **FQDN**: terminal full name

b) DHCP/DNS

The DHCP/DNS box is the following:



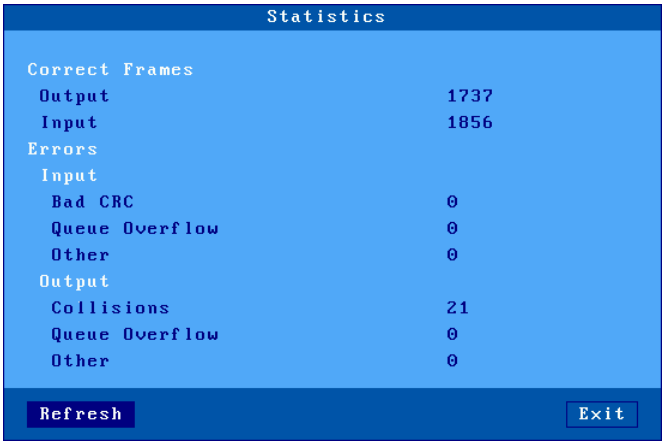
In the above dialog box, the following information is given:

- **State**: the current DHCP state. The possible states are:
  - **selecting**: searching a DHCP server (broadcast)
  - **requesting**: requesting an IP address from the DHCP server which answered 'selecting'
  - **bound**: search has been successfully completed (IP address has been set)
  - **free**: DHCP protocol is not enabled or DHCP protocol failed
  - **renewing**: renewing the leased IP address to the DHCP server which answered 'selecting'
  - **rebinding**: renewing the leased IP address to any DHCP server (broadcast)
- **DHCP Server**: IP address of the DHCP server.
- **Lease Time (seconds)**: amount of time of the leased IP address. For BOOTP protocol, the value is 'infinity'.
- **Remaining Lease**: remaining time before lease expires. For BOOTP protocol, the value is 'infinity'.
- **Update Type**: information about the DNS server update when updated by the terminal. Main values are:
  - **None**: no update
  - **Direct / Reverse**: both types are done by the terminal.
  - **Direct / Reverse (by DHCP)**: direct update done by the terminal and reverse update done by the DHCP server

- **Status**: the possible update values are:
  - **None**: no update (not requested)
  - **Done**: update succeeded
  - **Failed**: update failed
  - **Pending**: update in progress
  - **Dhcp**: update done by the DHCP server (the terminal had been informed to forgive the update)

c) Statistic

The statistics box is the following:



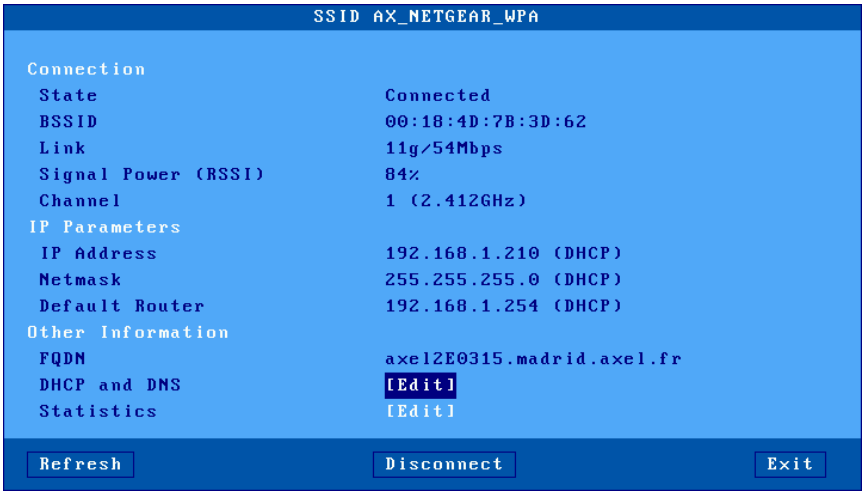
Correct Frames: "Output" and "Input" are the number of correct frames (transmitted and received)

Errors: this section gives the type and the number of errors. No errors should be shown in a good working environment/healthy network.

9.5.2 - Wireless Interface

a) State

The following information is displayed when selecting the **[Configuration]-[Network]-[Wireless Interface]-[State]** menu:



Note: this box information is automatically updated every 5 seconds. To force an update use the [Refresh] button.

When the wireless interface is connected, the 802.11 information available is:

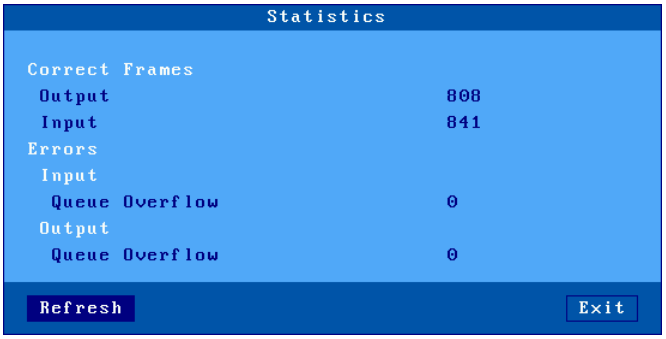
- **BSSID**: access point MAC address.
- **Link**: protocol and current speed.
- **Signal power** (reception)
- **Channel**: channel number and frequency

b) DHCP/DNS

The DHCP/DNS box is similar to the Ethernet dialog box.

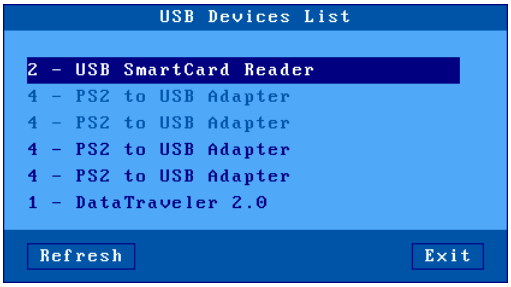
c) Statistic

The statistics box is the following:



9.6 - USB STATISTICS

The **[Diagnostics]-[USB]** menu lists the connected USB devices. For example:


USB Devices List
2 - USB SmartCard Reader
4 - PS2 to USB Adapter
4 - PS2 to USB Adapter
4 - PS2 to USB Adapter
4 - PS2 to USB Adapter
1 - DataTraveler 2.0
Refresh
Exit

For each line the number is the USB physical port number. The associated label is given by the USB product itself. If the USB product is supported, more information can obtained by clicking the product name.

- 10 -
REMOTE ADMINISTRATION

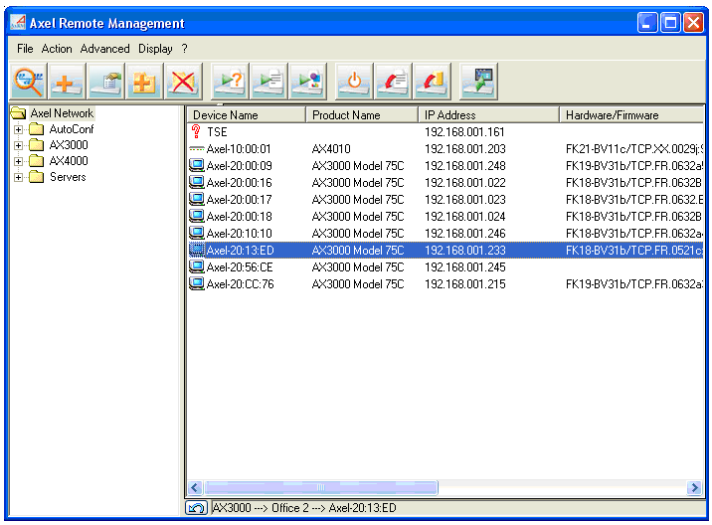
This chapter covers remote administration of the TCP/IP AX3000.

Four types of operations are provided by the remote administration:

- The use of AxRM,
- The remote control,
- The interactive telnet setup,
- The batch set-up (getting and sending a set-up file)

10.1 - AXRM: THE AXEL MANAGEMENT SOFTWARE

A Windows administration utility (AxRM or Axel Remote Management) is available at no charge from the Axel Web site (http://www.axel.com):



The AxRM software allows system administrators to manage and configure Axel TCP/IP products remotely over a network. The remote Axel device is selected by its IP address or network name. (The software can also assign an IP address to a newly installed terminal that has not had an IP address set)

AxRM is an abbreviation for Axel Remote Management software.

AxRM is used for:
- Obtaining hardware and firmware revision levels
- Obtaining Ethernet and serial line configuration
- Obtaining network and device statistics
- Obtaining set-up configuration
- Rebooting the peripheral
- Remotely configuring a peripheral
- Downloading firmware,
- Entering the interactive set-up via a telnet client.

It is also possible:
- To build and manage a terminal database,
- To compile a list (batch) of commands to run consecutively,
- To download a firmware though BOOTP,
- To set IP addresses by using the device MAC address.
- Repair terminals that have lost their firmware (bootp error)

For more information about the AxRM utility, read the manual "*Axel Remote Management - Administration Software for Axel Terminals and Office Servers"*.

10.2 - REMOTE CONTROL

This functionality allows an administrator to remotely take control of a terminal. The administrator can passively watch the users screen or actively take control with his own keyboard for various support or administration purposes.

Note: the remote control function must be enabled on the terminal (see below)

To set-up the remote control function, select the menu **[Configuration]-[Terminal]-[Remote Control]**. For more information, please refer to Chapter 3.2.7.

Use AxRM to take the control of the terminal. See Chapter 10.1.

10.3 - INTERACTIVE TELNET SET-UP

The AX3000 interactive set-up can be accessed through a telnet session. A specific TCP port is used.

The default value of this TCP port is 4096. This value can be changed. See Chapter 3.2.7.

We strongly advise using AxRM to open the telnet setup (see Chapter 10.1). But any telnet client could be used with the correct arguments as below

- ANSI emulation (with color support)
- TERM value: ansi
- Screen size: 80x25
- Scrolling mode disabled

Notes:

- To disable the telnet set-up, set the TCP port to 0.
- When the telnet set-up is running, the set-up is also displayed on the target terminal. The keyboard of the target terminal is locked.
- The AX3000 telnet server supports the keepalive mechanism (value 3 minutes). In event of network incident, the set-up will be automatically ended and the keyboard of the target terminal will be unlocked.

The possible connection errors are:

- The interactive set-up is already in use on the target terminal.
- The client telnet arguments as given above are not set.

10.4 - BATCH REMOTE SET-UP

This feature enables an AX3000 to be set up remotely, using the remote administration command.

10.4.1 - AX3000 Remote Set-Up

A text file (provided as an argument to the remote administration command) defines the value of some or all set-up parameters. It can either be:

- Created with a text editor or
- Obtained by a remote administration command on an AX3000 already set-up.

We strongly advise using AxRM to operate with the batch setup (see Chapter 10.1), but the native rsh system commands can be used.

The remote administration command parameters are:

- The name or the IP address of the AX3000,
- A command: one of the 3 following keywords:
  - **setup_send** : set-up an AX3000,
  - **setup_get** : get an AX3000 configuration,
  - **ax_reboot** : reset an AX3000.

Example for obtaining a set-up:

```
# rsh axname setup_get > /tmp/file<CR>
```

Example for sending a set-up:

```
# rsh axname setup_send < conf_file
```

Example for rebboting a terminal (required after sending a set-up):

```
# rsh axname ax_reboot
```

See Appendix A.7 for more information about administration command.

10.4.2 - Configuration File Format

A configuration file can list some or all AX3000 set-up parameters. And it begins with the label '`BEGIN_AX_SETUP`' and ends with the label '`END_AX_SETUP`'.

Example:

```
BEGIN_AX_SETUP V1.1
# this is a comment
tcp_host1_name=vangogh
...
END_AX_SETUP
```

Note: lines beginning with '#' are treated as comments and ignored.

When a configuration file is obtained from an AX3000, the inactive parameters (undefined hosts, print server unused, coloring mode disabled, etc) are commented out.

a) Header

```
BEGIN_AX_SETUP V1.1
#########################################################
#           TCP/IP AX3000 Platine Terminal              #
#                                                       #
#  Ethernet address: 00:A0:34:20:27:10                  #
#  Firmware: FK18.BV2.1a/TCP.FR.1236b.STD               #
#  12354                                                #
#########################################################
#
RESET_CMOS
```

Note: the RESET_CMOS command allows all the set-up parameters (except the AX3000 IP address) to be reset. This line can be deleted or set as a comment.

b) Substitution Commands

```
axname_encoding_string=       (yes | no)
```

Enabling "axname_encoding_string" allows some set-up parameters to contain 'substitution commands'. This allows variables such as the terminal name and the session number. The substitution is done when a set-up file is sent to the terminal.

☺ : this function is useful when multiple terminals are configured with the same set-up file, but each terminal requires certain unique parameters.

Notes:

- It works only through the remote set-up function. (It's not available with the interactive set-up).
- Some set-up parameters are not supported by this function: the terminal name, the passwords, the pre and post-printing sequences and the transparent mode sequences.

The substitution commands are:

- <$> is the parameter "tcp_axname"
- <#> is the screen session number (1 to 6) or the port session number (AUX1=1, AUX2=2, PARALLEL=3, USB1=4, USB2=5, USB3=6, USB4=7, NET1=8, NET2=9).
- <$(X,Y)> is an "tcp_axname" sub-string (start X, length Y).

  Notes:

  - If X is greater than the "tcp_axname" length, the substring is empty.
  - If X+Y is greater than the "tcp_axname" length the substring is truncated.
  - In event of syntax error the substitution is not done.

Example: if the terminal name is "axel201234":

TERM<$(7,4)>	=> TERM1234
TERM<$(7,10)>	=> TERM1234
TERM<$(20,7)>	=> TERM
TERM<$(20,A)>	=> TERM<$(20,A)>
<$(1,2)><$(7,4)>-<#>	=> ax1234-2 (ex.: session 2 or AUX2)

b) End of File

The configuration file must be ended with the label 'END_AX_SETUP'

APPENDIX

The following appendices give information about:

A.1 - Using the AX3000 interactive set-up
A.2 - Network overview (Ethernet address, IP address and routers)
A.3 - DHCP protocol
A.4 - DNS protocol
A.5 - Axel DHCP Option
A.6 - Dual Monitor
A.7 - Administration command list
A.8 - Going further...
A.9 - Hardware and firmware information

A.1 - USING THE INTERACTIVE SET-UP

A.1.1 - Entering the Set-Up

The following can be used to enter the AX3000 interactive set-up:

- Using <Ctrl><Alt><Esc> from the terminal
- Using the AxRM remote control command. See Chapters 10.1 and 10.2.
- Using Telnet to access the terminal remotely. See Chapter 10.3.

Note: the set-up can be password-protected, in which case the password must be entered to access the quick set-up dialog box. For more information, see Chapter 3.2.8.

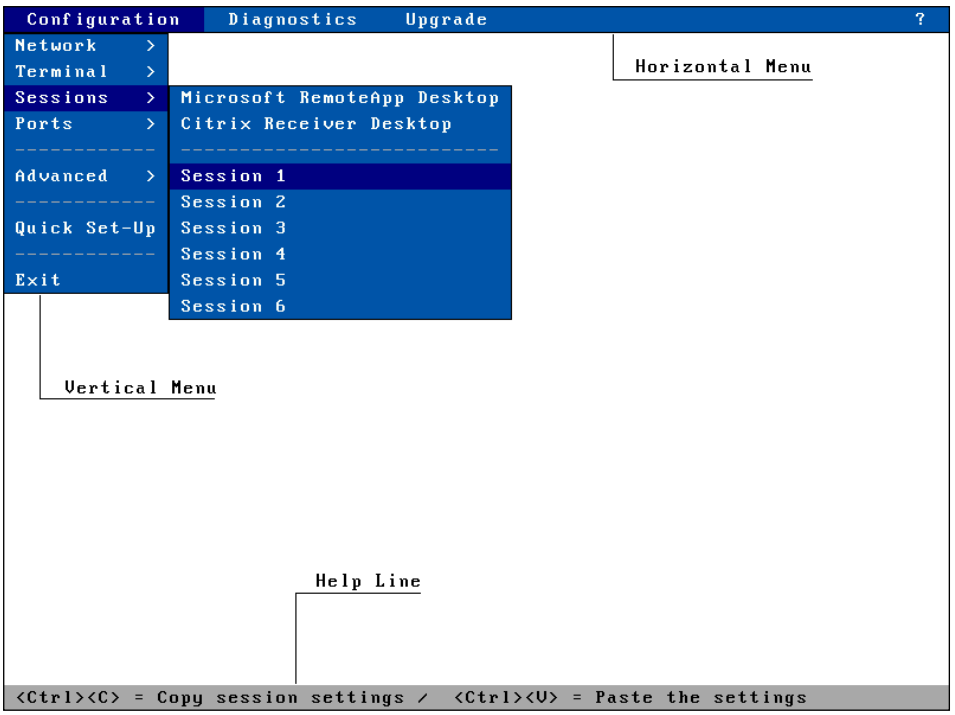
A.1.2 - Navigation

The AX3000 set-up comprises a horizontal general menu, with drop down vertical menus.

The mouse cannot be used within the telnet session.

A help line is located in the bottom of the screen.

The AX3000 set-up screen appears as follows:



a) The Horizontal General Menu

Move through the menu with horizontal arrow keys. A different vertical menu will be displayed automatically as each item is traversed.

b) Vertical Menus

Move through vertical menus with vertical arrow keys. Confirm the selected command by pressing **<Enter>** or **<Spacebar>**.

Note: the symbol '>', beside a vertical menu item, indicates that it is a sub-menu.

c) Dialog Boxes

Use the **<Tab>** or **<↓>** to move to next field or button. Use the **<Shift><Tab>** or **<↑>** to move to previous field or button.

Two types of fields are distinguished in a dialog box:

- Button: press **<Enter>** or **<Spacebar>** to perform the associated action.
- Parameter: two types of value occur:
  - A free value (numeric or character string): the data capture mode is automatically enabled (see the next chapter).
  - A discrete value: press **<Spacebar>** to show the permitted values or to display a list of values. Move through lists with vertical arrow keys; confirm the selected value by pressing **<Enter>.** Press **<Esc>** to cancel.

Notes:

- Pressing **<Enter>** on a 'Parameter' field' allows the default button ([OK], [Next]…) to be selected.
- Pressing **<F10>** allows selecting the 'default' button. Or, if this button is already selected, perform the associated action.

Select the [OK] button to save modifications and exit the dialog box. Select the [Cancel] button or press **<Esc>** to exit the dialog box without saving modifications.

A.1.3 - Enter Data

When a 'free value" parameter field is selected, a value must be entered (it cannot be selected from a list).

Note: to indicate ‘free value’ mode, the cursor blinks at the beginning of the field.

During this mode the following keys are enabled:

- **<Tab>, <↓>**, **<Shift><Tab>**, **<↑>**: valid the value and move to the next/previous field.

- **<Esc>**: abandon your changes
- **<←>** and **<→>**: move the cursor within the character string
- **<Home>** and **<End>**: move the cursor directly to the beginning or the end of the string
- **<Del>**: delete the character at the cursor position
- **<Backspace>**: delete the character before the cursor position
- **<Insert>**: one of two editing modes (Insertion/Overwrite)

To enter characters with an ASCII code lower than 20 hexadecimal, use a backslash ('\') before the hexadecimal value. For instance, the 'Esc z' sequence can be encoded by '\1Bz'.

Note: when the character string is longer than the length of the field, two indicators are displayed at the left and at the right of the field.

A.1.4 - Special Notation

The set-up is a sequence of menus and sub-menus. Define an action by the path followed through the set-up tree (hierarchy), using the following notation:

[item1]-[item2]-[action]

For example, to perform the above **action**, select **item1** in the main menu, then select **item2** in the sub-menu.

A.1.5 - Exiting the set-up

To exit the set-up, select **[Configuration]-[Exit]**.

If changes have been made while in the set-up, a dialog box appears:

- Select [Yes] to save the modifications and exit the set-up. The new AX3000 settings will then be stored in NVRAM (non-volatile memory).
- Select [No] to abandon your changes and exit the set-up.

A.2 - NETWORK OVERVIEW

A.2.1 - Ethernet Addresses

AX3000 terminals (like other devices equipped for Ethernet networking) have a unique hardware address which is issued by the manufacturer and cannot be modified. This address is in the form of six hexadecimal bytes, separated by colons:

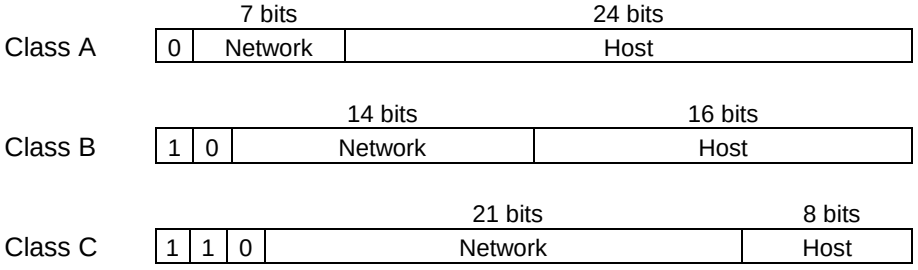
AX3000 Ethernet address format:
00:A0:34:xx:xx:xx

Select the '?' command in the horizontal menu of the AX3000 set-up to see the AX3000 Ethernet address.

A.2.2 - IP Address

Every device connected to an Ethernet network must have a single 32-bit address which encodes both the network and the host ID. Internet addresses (sometimes called «IP addresses») are usually written as four decimal numbers separated by decimal points ('.' character).

There are three main classes of IP address:



Thus every IP address occupies 4 bytes and contains both:
- A network address, and
- A host address.

Note: all devices attached to the same network must have the same class and the same network address. Each must have a **different** host address.

For example: an AX3000 connected, over a network, to a host with an IP address 192.1.168.40 (class C: three bytes for the Network address) must have the three first bytes of its address set to 192.1.168. The fourth byte cannot be equal to 40.

A.2.3 - Router

Depending on the network topology, the AX3000 and the host may be installed on different physical networks and linked through one or several routers.

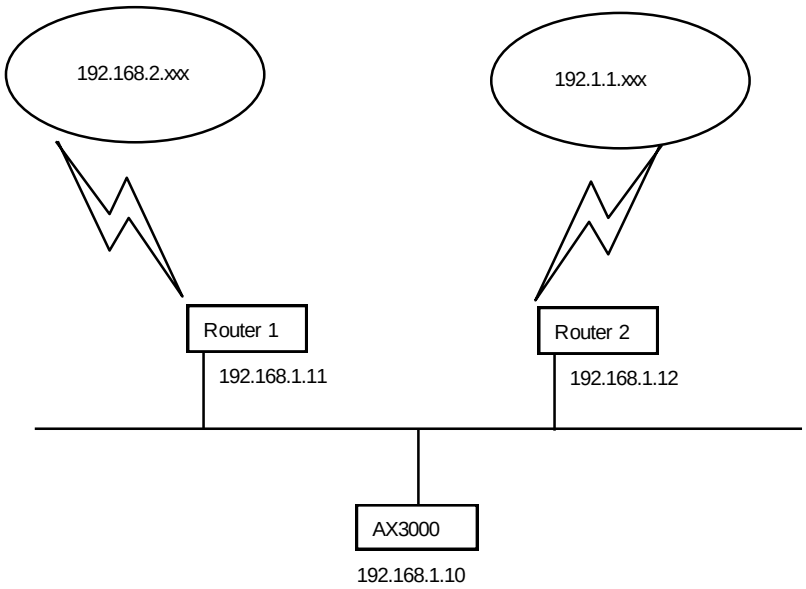
Two types of router can be used to access remote networks:
- A default router: this router knows how to reach many remote networks.
- Specific routers: in charge of one remote network.

The default router is only identified by an IP address.

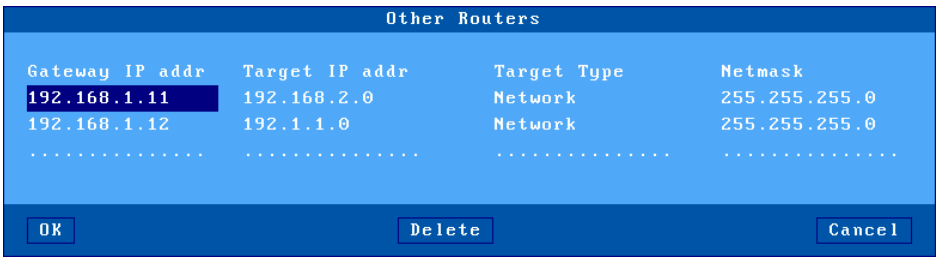
The specific routers are identified by the following parameters:
- **Router IP address**: this router must be connected to the same network as the AX3000.
- **Destination IP Address**: IP address of the host or the network to be reached.
- **Destination Type**: two values:
  - **Host**: the destination is a single host,
  - **Network**: the destination is a whole local network (the class mask is applied to this IP address).

Notes:
- At the AX3000 level, the routing algorithm uses a specific router to reach the destination. If no specific router fits, the default router is used.
- The AX3000 doesn't support ICMP REDIRECT requests (dynamic routers are not supported).

Example 1: router 1 is used to reach the 192.168.2.xxx network and router 2 is used to reach the 192.1.1.xxx network:



The AX3000 route table will show the following:



Example 2: router 1 is used to reach both networks (192.168.2.xxx and 192.1.1.xxx):

The AX3000 route table is:

A.3 - THE DHCP PROTOCOL

DHCP (Dynamic Host Configuration Protocol) is an industry standard protocol that lets a DHCP server (Unix, Windows, AS/400, etc.) allocate temporary IP addresses and other network parameters to terminals and PCs when they are powered on. This can greatly simplify managing large networks.

A.3.1 - Overview

Here is a brief description of Axel's implementation DHCP:

- At boot time the AX3000 broadcasts DHCP requests to find the DHCP server.
- If a DHCP server is found and correctly set-up, an IP address, and subsequently other parameters are given to the AX3000.
- Before accepting the IP address the AX3000 can be set to check that the IP address given really is free (ARP protocol).
- The IP address offered is given temporarily. This duration is called the 'Lease Time'.
- If a lease time has been entered through the AX3000 Set-Up, this lease time is offered to the DHCP server, which may or may not accept this value.
- The AX3000 is expected to renew its lease before the lease expires. Once the lease has expired the AX3000 is no longer permitted to use the assigned IP address.

- Generally an IP address is dynamically assigned out of a pool of IP addresses. However static IP addresses can be associated to AX3000s (for instance when the AX3000's print server is used). This association is performed either by using the AX3000 Ethernet address or by using a 'Client Identifier' (which is a character string entered through the AX3000 Set-Up).
- The DHCP protocol can be considered as a superset of the BOOTP protocol. IP addresses can also be offered to AX3000s by a BOOTP server (in this case the 'lease time' is infinite).
- The AX3000 DHCP client protocol is compliant with RFCs 1533 and 1541.

This section deals only with the AX3000 DHCP protocol use. To set-up and enable a DHCP server please read your operating system's manual.

A.3.2 - Setting-Up the AX3000

DHCP protocol is set through either the AX3000 Quick Set-Up or the AX3000 Interactive Set-up. For more information, see Chapters 2 and 3.

A.3.3 - Using the AX3000

If the DHCP protocol is enabled the AX3000 automatically requests an IP address on boot, the message 'DHCP in progress' is displayed on the bottom of the screen.

Note: the search can be aborted by entering the set-up.

If a DHCP (or BOOTP) server is available an IP address is given after a few seconds. This dialog box is then cleared and the AX3000 follows its normal behavior: either the set-up idle is displayed (no automatic session is set) or an automatic connection is opened.

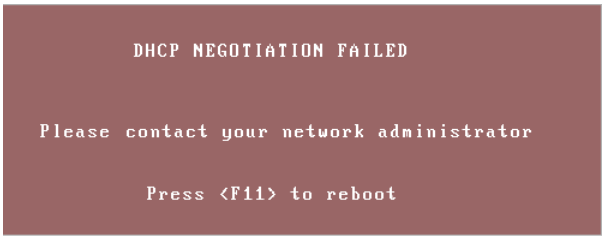
Further 'lease time' re-negotiations are totally invisible to the AX3000 user. Only error messages are displayed (see next chapter).

Note: enter the set-up to find out the AX3000 IP address or other parameters offered by the DHCP server.

A.3.4 - Errors

a) Boot Time Failure

The AX3000 automatically searches for a DHCP server on booting. If after 30 seconds no DHCP (or BOOTP) server answers the following dialog box is displayed:



At this stage two options are available:

- <F11>: rebooting the AX3000 to run the DHCP search again.
- <Ctrl><Alt><Esc>: entering the set-up to modify AX3000 settings.

b) Re-negotiation Failure

The lease time must be regularly re-negotiated (except if the IP address has been offered by a BOOTP server).

If a re-negotiation fails the following dialog box is displayed:

WARNING: DHCP REBINDING TOO LONG
The AX3000 could be disconnected in 2 minutes
Please log-off before automatic shutdown
Press <F11> to reboot

This indicates that in two minutes the AX3000 will be no longer be permitted to use the leased IP address and the session will be terminated

If after these two minutes, the re-negotiation has still failed, an error box is displayed and all current sessions (telnet, tty, lpd, etc.) are closed (i.e. lost). And the terminal is shutdown.

Note: the AX3000 Trace Mode allows a trace of data exchanged between the AX3000 and the DHCP server (see Chapter 3.1). This is useful to diagnose problems.

A.4 - THE DNS PROTOCOL

The DNS protocol (Domain Name System) allows names to be 'resolved' by the AX3000. Resolving is retrieving an IP address associated with a name.

A.4.1 - Overview

A domain (computer network) can be considered as a tree, with branches (nodes) such as hubs, switches, routers, print servers etc, and leafs, for example PCs, terminals and printers.

The domain system makes no distinction between the use of interior nodes and leafs, and this documentation uses the term "nodes" to refer to both. (I.e. any network resource).

Each node has a name (**Label**) which must be unique to other nodes at the same level, but not necessarily unique within the whole network.

Label syntax:

- Permissible characters are letters (a..z to A..Z), numbers (0..9) and the hyphen (-).
- A Label must begin by a letter and be ended by a letter or a number.
- The resolution is not case-sensitive.

The domain name of a node is the list of the labels on the path from the node to the root of the tree. A dot is used to separate each label. Two types of host names can be distinguished within the AX3000:

- **A full name**: one or more dots are included in the name.
  Example: "www.axel.com"

- **An incomplete name**: no dots are used. The resolution procedure concatenates another character string to this name (the default DNS domain name). For more information see Chapter 3.1.2.
  Example: "as400" is concatenated with "servers.axel.com" to create a full name of "as400.servers.axel.com"

A host name is only resolved if the IP address is needed. (i.e. to open a session or to ping).

Note: a name is resolved for each connection attempt, even if its IP address has been obtained by a previous resolution.

A.4.2 - Resolving a Name

a) Resolution Strategy

To resolve a name, a DNS request is sent by the AX3000. A DNS request contains the destination DNS server IP address and the name to be resolved.

To resolve a name possibly more than one DNS request is needed (if one or more default DNS domains are defined). The resolution process is stopped either when the AX3000 receives a positive response from a DNS server (success: an IP address is associate to this name) or when all the DNS requests has been sent and no positive response has been received (failure: the name is not resolved).

The order of the requests sent to resolve a hostname is called the resolution strategy.

The resolution strategy depends on both:
- Whether or not a domain name is declared,
- Whether the name to resolve is complete.

If no default DNS domain is defined in the AX3000 Set-Up, the resolution is done with the name itself regardless of whether the name is full or not.

If one or more default DNS domains are defined, the resolution strategy depends on the name:

- Full name: the resolution is first done with this name. If unsuccessful new resolutions are performed by concatenating the full name with the defined DNS domains.
- Incomplete Name: the resolutions are first done with the defined default DNS domains. If unsuccessful a new resolution is performed with this incomplete name.

Example of name resolutions: looking at the host table in Chapter 3.1.3 the name resolution attempts are:

- **as400**: this is not a full name, the resolution is first made with the first DNS domain (as400.servers.axel.com). Then, in event of failure, with the second DNS domain (as400.terminals.axel.com). Then, in event of failure, the resolution is made with the name itself (as400).
- **linux**: an IP address is associated. No DNS resolution.
- **www.axel.com**: this is a full name. The resolution is first made with the name itself (www.axel.com). Then, in event of failure, the resolution is made with the first DNS domain (www.axel.com.servers.axel.com). Then, in event of failure, with the second DNS domain (www.axel.com.terminals.axel.com).

b) Resolution Method

To resolve a name, the AX3000 sends DNS requests to the DNS server(s).

If a DNS server sends back a positive response, then the IP address is found and the resolution operation is completed. If not two cases of failure are possible:

- **Receiving a negative response**: the name is not known by this DNS server. The AX3000 will retry with a new DNS request or with the second DNS server.
- **No response (time-out)**: after a few seconds the DNS server has not sent back a response. The AX3000 resends the same request to the DNS server.

  Note: after 4 time-out errors on the same DNS server, this server is "removed" from the resolution operation.

Note: if a response previously considered as a time-out error is received, this

response is treated as a valid response (positive or negative).

The AX3000 requests a **recursive search** to the DNS servers (and not iterative search). This means that the DNS server must search itself for a DNS server which is able to resolve the required name.

The resolution operation depends on the number of DNS servers. These are the steps for a one-server resolution and a two-server resolution.

One DNS Server:

1 - A DNS request is sent to the server.
2 - In event of no response, this request is sent again (4 times max.).
3 - In event of negative answer, the resolution is aborted.
4 - If other requests can be sent (default DNS domains are defined), go back to step 1.

Two DNS Servers:

1 - A DNS request is sent to the server 1.
2 - In event of no response from server 1, this request is sent to the server 2.
3 - In event of no response from server 2, go back to step 1 (4 times max.).
4 - In event of negative answer from any server, the resolution is aborted.
5 - If other requests can be sent (using default DNS domains are defined), go back to step 1.

Example: looking at the screen shots of the Chapter 3.1, these are the DNS requests sent to resolve "as400" with 2 DNS servers and 2 default DNS domains (of course this process is stopped if one DNS server sends back a positive response):

- "as400.servers.axel.com" to DNS server 1
- "as400.servers.axel.com" to DNS server 2
- "as400.terminals.axel.com" to DNS server 1
- "as400.terminals.axel.com" to DNS server 2
- "as400" to DNS server 1
- "as400" to DNS server 2

c) Messages Displayed on the AX3000 Screen

To open a session the AX3000 must resolve the host name (if no IP address

has been associated through the set-up).

This is a screen-shot example when the resolution successes:

```
Connecting to as400.servers.axel.com:23 (Telnet)...
Session number 1
Resolving...
Resolved: 192.168.1.180
Connected
```

Explanation: the AX3000 attempts to resolve "as400.servers.axel.com". The resolution process returns the IP address which is 192.168.1.180.

In the event of a problem, the "Resolved: a.b.c.d" message is replaced by an error message. For example:

```
Connecting to as400.servers.axel.com:23 (Telnet)...
Session number 1
Resolving...
Srv: domain not found
Press <Ctrl><Alt><Shift><D> to close this session
```

Error messages: error messages reported by the DNS server begins with Srv. Error messages from the terminal begin with "Loc". The main messages are:

- **Srv: domain not found**: the name doesn't exist within this domain.
- **Srv: refused query**: the DNS servers refuses to respond to the request. This could be due to a DNS server security function.
- **Loc: no DNS server defined**: no DNS server has been defined through the AX3000 Set-Up.
- **Loc: name syntax error**: the syntax of the name to resolve is not correct (for example two consecutive dots: as400.servers).
- **Loc: timeout**: no DNS server responds
- **Loc: no memory**: due to a temporary memory overload, the AX3000 can not process the name resolution. Retry later.

When the resolution fails, the session must be manually closed. This is done by pressing <Ctrl><Alt><Shift><D>.

A.4.3 - Publishing the Terminal Name

The terminal name may be registered with the DNS server. This can be done by the DHCP server or by the terminal itself.

a) By the DHCP Server

Important: the DHCP server must support the DDNS (Dynamic DNS) function.

To register the terminal name by the DHCP server:
- Enable the DHCP protocol
- Set "DNS Server Update" to "by the DHCP server"

Because the DNS server is updated by the DHCP server the information about the type ("direct" or "direct / reverse") and the result (success or failure) of the DNS update is not returned to the terminal.

b) By the terminal

The terminal can register itself. The terminal behavior depends on the value of "DNS Server Update" option:
- **By the terminal**: the terminal updates the DNS server only if the DHCP server is agreed.
- **By the terminal (forced**): whatever the DHCP server information, the terminal updates the DNS server (use carefully).

According to the option 'Update Type', the terminal updates "direct (A)" or "Direct (A) and Reverse (PRT)" DNS server records.

For a "Direct (A)" update, two entries are added in the DNS server database:
- A "Host" type entry, containing the terminal IP address,
- A "Text" type entry, containing the terminal signature.

Note: the DNS server will be updated only if the terminal name is a full name: ended by a DNS domain (i.e. FQDN).

For a "Reverse (PRT)" update, one entry is added: a "Pointer" type entry, containing the terminal's full name.

Note: the signature allows the terminal to check its "Host" type entry. If the check fails (i.e. no associated signature or wrong associated signature) the terminal's behavior during the DNS server update depends on the value of the set-up parameter "**Action on Error**" (see Chapter 3.1):

- **Display an error**: a red dialog box is displayed. The user may reboot the terminal or enter the set-up.
- **Continue the update**: the entries ("Host", "Text" and "Pointer") are overwritten.
- **Cancel the update**: the DNS update is aborted but the terminal is available for use.

The type ("direct" or "direct / reverse") and the result (success or failure) of the DNS update are returned to the terminal and are available in the terminal set-up. See chapter 9.5.

A.5 - SETTING-UP AXEL DHCP OPTIONS

In addition to the standard options (IP addresses, DNS server...), the DHCP server can be used to communicate manufacturer specific information: this allows to set "**Axel DHCP options** ".

For example, Axel's auto-configuration feature (see chapter 2.1) requires the terminal to know the network location of the machine running the management tool (AxRM). This information can be given to terminals using this DHCP feature.

A.5.1 - Overview

A DHCP server has various options numbered as follows:

- From 1 to 223: reserved options. For example, option 3 gives the list of routers and 15 lists DNS servers.
- From 224 to 254: private options. Available for manufacturers use.

The Axel options are contained within the range of numbers from 231 to 240. The 'type' is always 'character string'. The format of the entry is as follows:

- Entry starts with a keyword followed by one or more parameters.
- The symbol ":" is used as separator.

☺: In contrast to some implementations Axel uses a ‘keyword’ rather than a specific number. The actual number (231 to 240) is irrelevant so any non-conflicting number in this range can be used.

For more information on the Axel options see chapter A.5.3.

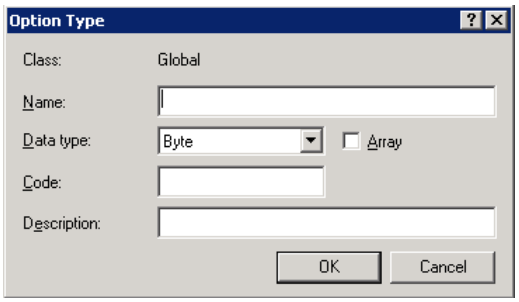
A.5.2 - Adding an Axel option with the Microsoft DHCP Server

To add an Axel DHCP option with Microsoft’s DHCP server see below:

1 - Launch the DHCP utility.

Right click on the IP address of the DHCP server and select ‘Set Predefined Options’ and select ‘Add'

2 - The following dialog box is displayed:



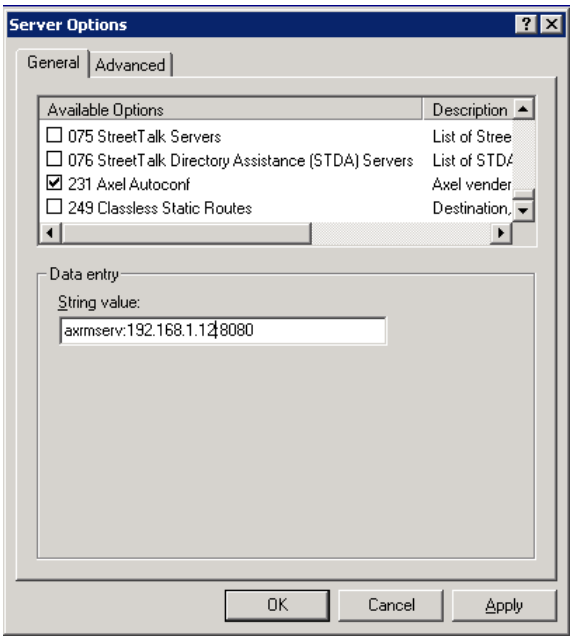
Complete the fields as follows:

- Name = (User definable) for example ‘Axel Autoconf’
- Data Type = (mandatory) string
- Code = (User definable) select unused number between 231 and 240
- Description = (User definable) for example "Axel vender option for auto-configuration".

Click ‘OK’ to exit this box and 'OK' again to exit the former box.

3 - In the left panel select 'Server Options’ then right click ‘Configure Options’ Within the available options ‘tick’ the new Axel entry and enter IP and TCP port

details as below as ‘string value’. For example:



Note: the changes take immediately effect.

A.5.3 - 'axrmserv' option: auto-configuration

The axrmserv option always the network location of the AxRM server to be broadcast.

The format is as follows:

```
axrmserv:param1:param2
```

The parameters are:

- The IP address or DNS name of the AxRM server
- The TCP port AxRM is listening on

Having two parameters is not mandatory nor is the order important. For

example you may only need to enter the IP address if the default port 80 is being used.

The table below gives examples:

	AxRM Network Location	
	IP address	TCP port
`axrmserv:mypc:82`	"mypc" DNS resolution	82
`axrmserv:82`	The IP address will be given by the method 2 or 3 (see chapter 2.1).	82
`axrmserv:192.168.0.1`	192.168.0.1	80

A.6 - DUAL MONITOR

A.6.1 - Overview

Axel terminals do not have two monitor connectors, so to maximize flexibility and our customer's investment in existing hardware we provide a firmware upgrade that essentially "partners" two existing terminals:

- The first terminal (the Master) controls the left screen, controls the keyboard and mouse, and connection back to the server
- The second terminal (the Slave) invisibly manages the right screen

Note: There is an option to position the screens vertically (upper and lower) for kiosk type applications.

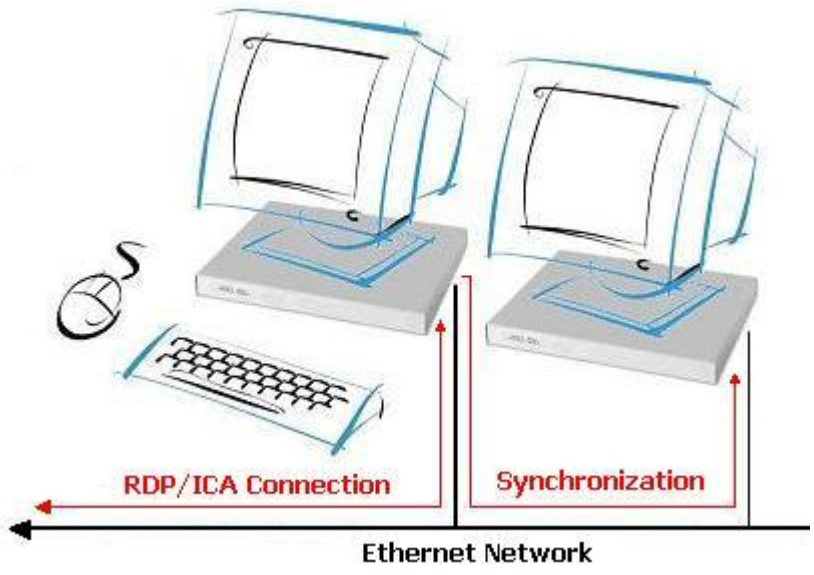
Any combination of M80 (FK56) and M85 (FK51 / FK52) terminals can be used for dual monitor.

Note: the M80F (FK55) can be only associated with another M80F.

The slave does not need a keyboard and is totally driven by the master. Any changes made to the master, for example changing the resolution, are automatically propagated to the slave.

Dual monitor is supported on all RDP and ICA type connections (including VDI). The master alone makes the connection to the server, so only one connection is seen from the server.

Note: This method provides proper full dual screen support – ie if an application is maximized it will “snap” to fill its single screen. (ie not both screens as do some implementations) Also the Windows task bar is only displayed on the master.



A.6.2 - Configuration

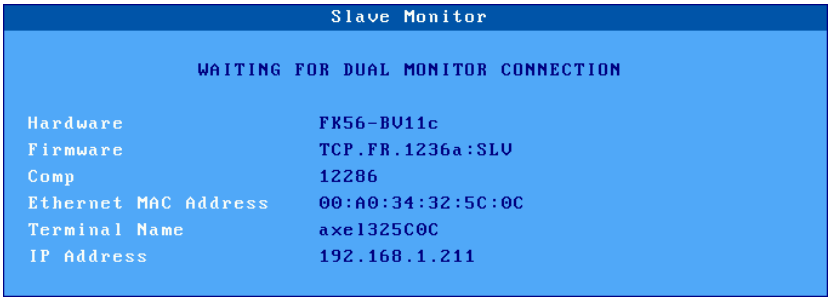
Both firmware revisions must be the same. But a standard firmware (STD) is installed on the master and a specific firmware (SLV option) is installed on the slave. Both terminals will have their own IP address - either static or via DHCP.

For the master, the double monitor mode must be configured at the 'general' level (Chapter 3.2.2) and at the session level (Chapters 5.1.4 and 5.2.6).

No configuration is requested for the slave terminal.

A.6.3 - Operating Mode

At the boot time, the slave waits for an incoming connection from the master:



When the master is started, a connection to the slave is issued (with the MAC address given in the terminal set-up).

In event of error a dialog box is displayed. This allows to "Retry' or "Ignore" (in this case the master will be used in single monitor mode).

Note: the status of the dual monitor connection is shown by a specific icon in the master terminal status bar. (See Chapter 4.2)

When the master is actually connected to the slave, the slave dialog box is closed. Then the master checks if the slave firmware revision is the same than his. If OK, then the slave configuration is checked and if needed the slave is reconfigured by the master.

The dual monitor mode is ready to be used. At this point in time only the master can display VNC, telnet and 5250 sessions, the slave will be blanked for text emulations. You can run a combination of Windows dual monitor sessions and text single monitor sessions concurrently.

A.7 - RSH ADMINISTRATION COMMAND LIST

Several administration commands are offered by the AX3000. These commands are launched by using a remote administration command (**rsh** for

example) which is available as standard features from most major operating systems.

The following table lists the available AX3000 administration commands:

Command	Description
ax_reboot	Rebooting the AX3000. Example: rsh ax3000 ax_reboot [password]
ax_sinit	Resetting an AX3000 resource (screen session or aux. port) Example: rsh ax3000 ax_sinit [password] sess1
setup_get	Requesting the AX3000 Full Set-Up. Example: rsh ax3000 setup_get > file
setup_get	Requesting the AX3000 Set-Up with only significant options. Example: rsh ax3000 setup_get > file
setup_get_lite	Requesting the AX3000 Set-Up. Example: rsh ax3000 setup_get > file
setup_send	Setting-up the AX3000 through a text file. Example: rsh ax3000 setup_send [password] < file
ax_download	Requesting an AX3000 firmware downloading. Example: rsh ax3000 ax_download [password] 192.1.1.1 file
ax_version	Requesting the AX3000 firmware revision. Example: rsh ax3000 ax_version
ax_getstat	Requesting the AX3000 statistics. Example: rsh ax3000 ax_getstat

Note: these commands are also available with uppercase characters (ax_version and AX_VERSION are the same command).

A.8 - MORE INFORMATION...

A.8.1 - Reload Factory Settings

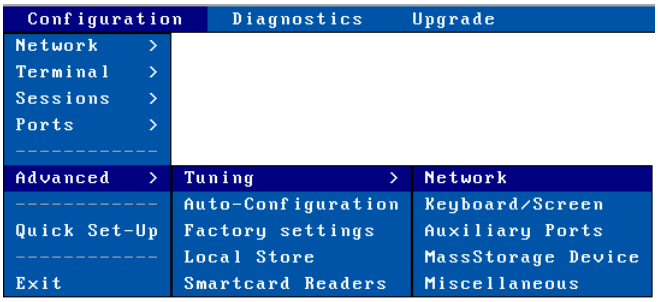
The menu **[Configuration]-[Advanced]-[Factory Settings]** allows, after confirmation, terminal factory settings to be reloaded. **The current configuration is lost**.

On next boot, the Quick Set-Up will be displayed and the Auto-Configuration service will be started (see Chapter 2).

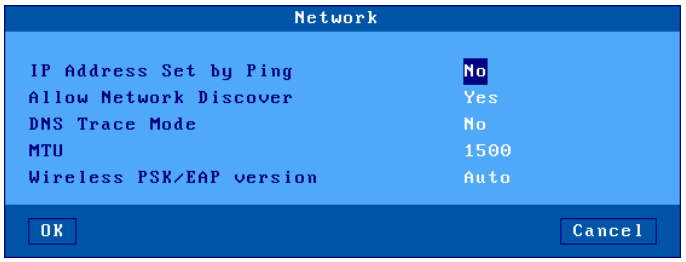
A.8.2 - General Level: Advanced Parameters

This chapter describes special AX3000 operating parameters. Usually the default values are suitable.

All these general parameters are located in sub-menus from **[Configuration]-[Advanced]-[Tuning]**:



a) Network Menu



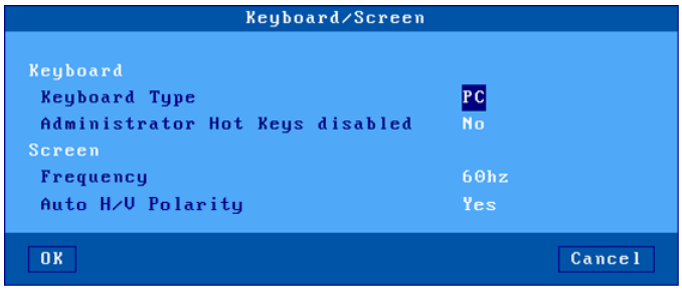
IP Addr. Set by Ping: this parameter allows or disables the AX3000 IP Address to be set by a ping command. (See Appendix A.8.6.)

Allow Network Discover: by default, SNMP requests are supported by Axel terminals. This allows terminals to be discovered by AxRM (the Axel administration software). This parameter can be used to disabled the SNMP support.

DNS Trace Mode: turn on/off DNS trace messages.

MTU: set the Maximum Transfer Unit value (Ethernet layer).

b) Keyboard/Screen Menu



Keyboard Type: by default PC keyboards (102/105 keys) are supported by the AX3000, but other keyboards type are available for special use:

- AS400 (F24): 122-keys keyboard (24 function keys) for 5250 emulation,
- ANSI (F20): keyboard with 20 function keys for VT220 emulation.

Note: Do not experiment with keyboard types – i.e. if you do not have an AS400 keyboard do not select AS400

Administrator Hot-Keys disabled: this parameter allows certain AX3000 hot-keys to be disabled, possibly useful if the terminal is installed in public places. For example, this prevents a user from invoking <Ctrl><Alt><Del> function. For more information, see Chapter 4.9.
Note: when this parameter is set to 'yes', the "consultation mode" and the "super password" don't allow the set-up to be entered.

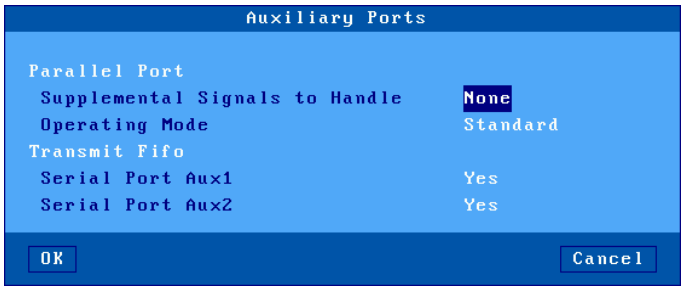
Screen Type (only available with the firmware TXT option): by default the Screen Type is set to TFT. A CRT type can be selected. It's used only for displaying text-based session in 132-column mode.

Frequency: by default the Frequency is set to 60Hz. An alternate value is available: 75Hz.

Auto H/V Polarity: by default, the horizontal & vertical sync polarities for the 'recommended' resolution are detected when the thin client is powered on

(EDID protocol). This can be disabled and 'hard-coded' values are used.

c) Auxiliary Ports Menu

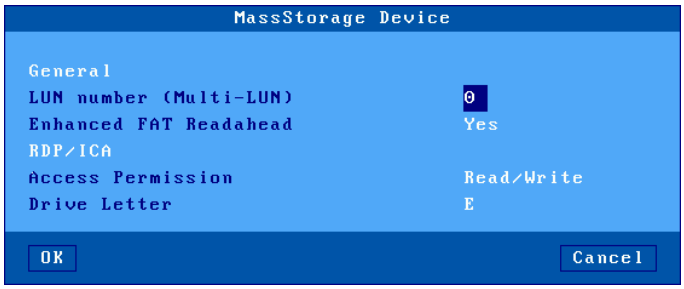


Supplemental Signals to Handle: the AX3000 checks the printer status by reading both the "Busy" and "Select-In" signals before printing. The AX3000 will not transmit data for printing if the printer handles only the "Busy" signal.
This parameter determines whether the "Select-In" and/or "Paper Empty" signals will be selected in addition to the "Busy" signal (which is always used).

Operating Mode: data is usually sent to the parallel port through a method based on 'interrupts'. This makes efficient use of the AX3000 CPU.
In event of problems (no printing or a very slow printing), it is possible to change this parallel port management and to send data by a 'polling' method. To enable this method, set the "Operating Mode" parameter to "Standard".

Transmit FIFO, AUX1 and AUX2 ports: the AUX1 and AUX2 ports provide an embedded transmit buffer (FIFO). This allows the data transmission to be optimized. By default this mechanism is enabled.
If necessary this parameter allows the AUX1 (or AUX2) FIFO buffer to be disabled.

d) Mass Storage Devices Menu



LUN Number: some USB drives may be formatted in multi-LUN mode (multiple partitions). But the Axel Thin Client handles only a single LUN. This option allows the LUN number to handle to be selected. (If the LUN Number is too high, the LUN #0 will be used).

Enhanced FAT Readahead: this option allows performances to be increased. It could be disabled.

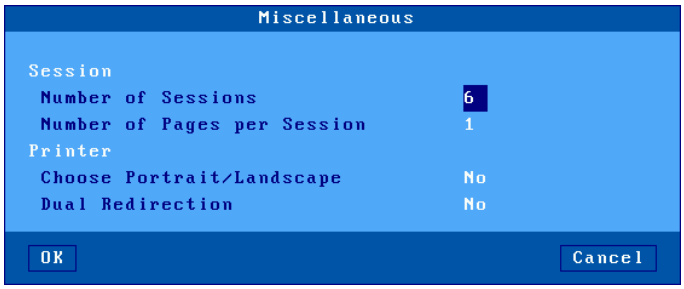
External USB mass storage devices (memory sticks, hard drives, CD/DVD readers…) are redirected to the Windows/Citrix server and are seen as local drives

The USB drive parameters are:

- **Access Permission**: 'Read Only' and 'Read/Write'
- **Driver Letter**: mnemonic given to the Windows server.

Important: this box allows “global” parameters to be set-up. It is necessary to also enable/disable USB drive redirection per session (see Chapters 5.1.6 and 5.2.8).

e) Miscellaneous Menu



Number of Sessions: this parameter is the maximum number of concurrent connections. Its value is from 1 to 6.

Number of Pages per Session: this parameter allows multi-page support. This may be used by legacy text application under Unix/Linux.
Important: the 'Number of Sessions' multiplied per the "Number of Pages per Session" must not exceed 6.

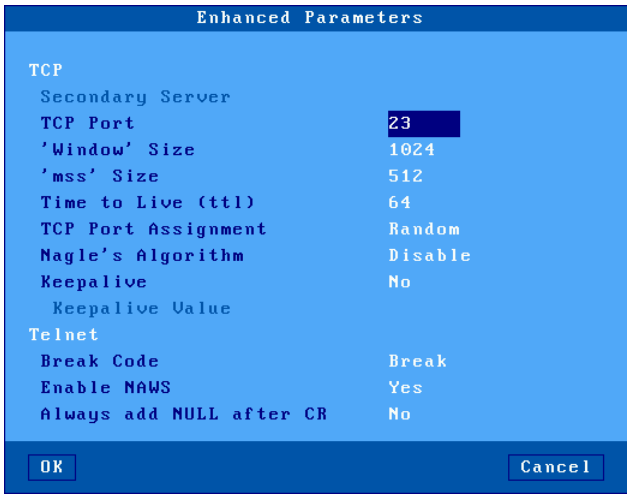
Choose Portrait/Landscape: when this option is set, printer string sequences can be entered for the "default printer port" and printer services (LPD, Prt3270…). These sequences allow a portrait/landscape mode to be selected via a terminal status bar icon (see Chapter 4.2).

Dual Redirection: this option allows 2 logical printers to be created per RDP/ICA redirected printer.

A.8.3 - Session Level: Enhanced Parameters

Each session (screen or auxiliary port) offers enhanced parameters. These parameters are available through the "Connection Properties" box (depending on the session type this box is located in the **[Sessions]-[Session x]** menu or the **[Aux. Ports]-[xxx]** menu).

This is an example of the dialog box:



Notes:

- The available parameters depend on both the connection type (screen or auxiliary port) and the associated protocol.
- New values are used for the next TCP/IP connection (no need to power-cycle the AX3000).

a) The 'Secondary Server' Parameter

A secondary server allows the user to select on which server the session is connected to. The server is chosen when the session is established. A mini-menu is displayed.

b) The 'TCP port' Parameter

This parameter is the server TCP port on which the session is connected. The default value depends on the current protocol.

c) The 'mss' and 'Window' Parameters

These two parameters are the AX3000 resources allocated to telnet and tty screen sessions for receiving network data:

- **mss** (maximum segment size) is the largest segment of TCP data. This size is negotiated with the server at the connection time.
- **window** is the reception windows size (i.e. the size of the buffer on which the TCP data is stored.

It is not advisable to modify these two values unless the input data flow is not continuous (i.e. the data flow pauses and resumes regularly during scrolling).

d) The 'Time to Live' Parameter

This parameter controls the ‘to live’ time of the datagram to prevent it being looped forever due to routing errors. Routers decrement the TTL of every datagram as it traverses from one network to another. When its value reaches 0 the packet is dropped.

This parameter doesn't impact the AX3000 performance.

e) The 'TCP port Assignment' Parameter

The AX3000 resources (screen sessions and auxiliary ports) are identified by numeric values called TCP ports.

The TCP port assignment can be either random or fixed. The default value depends on the current network service.

The random method means the AX3000 TCP ports are different after every re-boot. On booting the AX3000 generates a new base value. This value (x) is between 1024 and 3072. For each session a range of 8 TCP ports is given: session 1 = (x...x+7), session 2 = (x+8…x+15)... When a connection is established the next port of the associated range is used. After 8 connections, the same TCP port of a range is re-used.

The main benefit of this method is that if the AX3000 is suddenly powered off (power cut for example), at the next boot time, the connections are immediately accepted by the server. (i.e. the sessions are hooked on different sockets because the TCP ports are different). However this does create ‘phantom’ sessions, as the initial sessions are still active from the server’s perspective, and must be killed by the server.

This can be done with the ‘keepalive’ process, manually killing or rebooting.

In some situations it may be beneficial to have always the same TCP port for an AX3000 resource (to avoid phantom sessions or to identify connections). This is the fixed port assignment. With this method the AX3000 resources are always:

- session 1 = 1024, ..., session 8 = 1031,
- aux1 port = 1032, aux2 port = 1033, parallel port 1034.
- net1 = 1035, net2 = 1036,
- usb1 = 1037, ... ,usb4 = 1040

f) The 'Nagle's Algorithm' Parameter

The Nagle's Algorithm controls behavior of the output network dataflow of a TCP/IP device. This algorithm allows the number of datagrams sent by the AX3000 to decrease. However a certain latency may be noticeable due to the caching of data before transmission.

This algorithm is disabled to prioritize performance. However some operating systems require this function to be enabled.

g) The 'Keepalive' Parameter

The keepalive is a mechanism that allows the AX3000 to regularly check its TCP/IP connection status.

In event of network incident, the AX3000 is able to detect this incident and to close the related TCP/IP connections. This mechanism is also useful when DSL connections are used (the AX3000 IP address is reset on time per day).

By default the keepalive function is disabled.

The keepalive function is set in minutes

Note: with ISDN routers (which automatically drop the phone line) this regular data flow will prevent the router from hanging-up. In this scenario the keepalive can cause expensive phone bills.

h) The 'Break Code' Parameter

For the telnet session, the **<Ctrl><Alt><Pause>** hotkey sends a 'break' code to the host. This break code is defined by the RFC 854, this is 'IAC BREAK'.

If needed, this break code value can be modified. The extra values are:

- AO (Abort Output),
- IP (Interrupt process),
- None (<Ctrl><Alt><Pause> generates no code).

i) The 'Enabling NAWS' Parameter

The NAWS function (Negotiate About Window Size - RFC 1073) is an optional feature negotiated when the telnet session established. It allows the terminal screen format (line x row) to be indicated to the server (when the session is established or at any time when the screen format is modified).

This parameter allows this function to be disabled: some telnet servers don't correctly support the NAWS function.

j) The 'Always add NULL after CR' Parameter

This option allows being compliant with different telnet server implementation (about ASCII mode).

k) The 'National Language Negotiation' Parameter

This option is only available with 5250 emulation. It allows some environment variables (KBDTYPE, CODEPAGE and CHARSET) to be set.

A.8.4 - Keyboard Codes and Time Zone Names for RDP/ICA Sessions

a) Keyboard Codes

For RDP/ICA sessions a Microsoft keyboard code can be specified. (See Chapter 3.2.5) This code allows a keyboard nationality to be negotiated with the TSE server.

The following table lists the available keyboard codes:

Keyboard Nationality	Code
Afrikaans	0436
Albanian	041C
Arabic - United Arab Emirates	3801
Arabic - Bahrain	3C01
Arabic - Algeria	1401
Arabic - Egypt	0C01

Keyboard Nationality	Code
Icelandic	040F
Indonesian	0421
Italian - Italy	0410
Italian - Switzerland	0810
Japanese	0411
Korean	0412

Arabic - Iraq	0801
Arabic - Jordan	2C01
Arabic - Kuwait	3401
Arabic - Lebanon	3001
Arabic - Libya	1001
Arabic - Morocco	1801
Arabic - Oman	2001
Arabic - Qatar	4001
Arabic - Saudi Arabia	0401
Arabic - Syria	2801
Arabic - Tunisia	1C01
Arabic - Yemen	2401
Armenian	042B
Azeri - Latin	042C
Azeri - Cyrillic	082C
Basque	042D
Belarusian	0423
Bulgarian	0402
Catalan	0403
Chinese - China	0804
Chinese - Hong Kong SAR	0C04
Chinese - Macau SAR	1404
Chinese - Singapore	1004
Chinese - Taiwan	0404
Croatian	041A
Czech	0405
Danish	0406
Dutch - Netherlands	0413
Dutch - Belgium	0813
English - Australia	0C09
English - Belize	2809
English - Canada	1009
English - Caribbean	2409
English - Ireland	1809
English - Jamaica	2009
English - New Zealand	1409
English - Philippines	3409

Latvian	0426
Lithuanian	0427
Macedonian (FYROM)	042F
Malay - Malaysia	043E
Malay – Brunei	083E
Maltese	043A
Marathi	044E
Norwegian - Bokml	0414
Norwegian - Nynorsk	0814
Polish	0415
Portuguese - Portugal	0816
Portuguese - Brazil	0416
Raeto-Romance	0417
Romanian - Romania	0418
Romanian - Moldova	0818
Russian	0419
Russian - Moldova	0819
Sanskrit	044F
Serbian - Cyrillic	0C1A
Serbian - Latin	081A
Setsuana	0432
Slovenian	0424
Slovak	041B
Sorbian	042E
Spanish - Spain	0C0A
Spanish - Argentina	2C0A
Spanish - Bolivia	400A
Spanish - Chile	340A
Spanish - Colombia	240A
Spanish - Costa Rica	140A
Spanish - Dominican Republic	1C0A
Spanish - Ecuador	300A
Spanish - Guatemala	100A
Spanish - Honduras	480A
Spanish - Mexico	080A
Spanish - Nicaragua	4C0A
Spanish - Panama	180A

English - South Africa	1C09
English - Trinidad	2C09
English - United Kingdom	0809
English - United States	0409
Estonian	0425
Farsi	0429
Finnish	040B
Faroese	0438
French - France	040C
French - Belgium	080C
French - Canada	0C0C
French - Luxembourg	140C
French - Switzerland	100C
Gaelic - Ireland	083C
Gaelic - Scotland	043C
German - Germany	0407
German - Austria	0C07
German - Liechtenstein	1407
German - Luxembourg	1007
German - Switzerland	0807
Greek	0408
Hebrew	040D
Hindi	0439
Hungarian	040E

Spanish - Peru	280A
Spanish - Puerto Rico	500A
Spanish - Paraguay	3C0A
Spanish - El Salvador	440A
Spanish - Uruguay	380A
Spanish - Venezuela	200A
Southern Sotho	0430
Swahili	0441
Swedish - Sweden	041D
Swedish - Finland	081D
Tamil	0449
Tatar	0444
Thai	041E
Turkish	041F
Tsonga	0431
Ukrainian	0422
Urdu	0420
Uzbek - Cyrillic	0843
Uzbek – Latin	0443
Vietnamese	042A
Xhosa	0434
Yiddish	043D
Zulu	0435

Note: this list can be found on the MSDN Microsoft site:
http://msdn.microsoft.com/library/default.asp?url=/library/en-us/script56/html/882ca1eb-81b6-4a73-839d-154c6440bf70.asp

b) Name of Time Zone

For the RDP/ICA time redirection, a time zone name must be given (see Chapter 3.2.6). This **case-sensitive** name must belong to the following Microsoft list:

Time	Name of Time Zone
(GMT-12:00) International Date Line West	Dateline Standard Time
(GMT-11:00) Midway Island, Samoa	Samoa Standard Time

(GMT-10:00) Hawaii	Hawaiian Standard Time
(GMT-09:00) Alaska	Alaskan Standard Time
(GMT-08:00) Pacific Time (US and Canada)	Pacific Standard Time
(GMT-07:00) Mountain Time (US and Canada)	Mountain Standard Time
(GMT-07:00) Chihuahua, La Paz, Mazatlan	Mexico Standard Time 2
(GMT-07:00) Arizona	U.S. Mountain Standard Time
(GMT-06:00) Central Time (US and Canada	Central Standard Time
(GMT-06:00) Saskatchewan	Canada Central Standard Time
(GMT-06:00) Guadalajara, Mexico City…	Mexico Standard Time
(GMT-06:00) Central America	Central America Standard Time
(GMT-05:00) Eastern Time (US and Canada)	Eastern Standard Time
(GMT-05:00) Indiana (East)	U.S. Eastern Standard Time
(GMT-05:00) Bogota, Lima, Quito	S.A. Pacific Standard Time
(GMT-04:00) Atlantic Time (Canada)	Atlantic Standard Time
(GMT-04:00) Caracas, La Paz	S.A. Western Standard Time
(GMT-04:00) Santiago	Pacific S.A. Standard Time
(GMT-03:30) Newfoundland and Labrador	Newfoundland and Labrador Standard Time
(GMT-03:00) Brasilia	E. South America Standard Time
(GMT-03:00) Buenos Aires, Georgetown	S.A. Eastern Standard Time
(GMT-03:00) Greenland	Greenland Standard Time
(GMT-02:00) Mid-Atlantic	Mid-Atlantic Standard Time
(GMT-01:00) Azores	Azores Standard Time
(GMT-01:00) Cape Verde Islands	Cape Verde Standard Time
(GMT) Dublin, Edinburgh, Lisbon, London	GMT Standard Time
(GMT) Casablanca, Monrovia	Greenwich Standard Time
(GMT+01:00) Belgrade, Bratislava, Budapest	Central Europe Standard Time
(GMT+01:00) Sarajevo, Skopje, Warsaw	Central European Standard Time
(GMT+01:00) Brussels, Madrid, Paris...	Romance Standard Time
(GMT+01:00) Amsterdam, Berlin, Bern, Rome	W. Europe Standard Time
(GMT+01:00) West Central Africa	W. Central Africa Standard Time
(GMT+02:00) Bucharest	E. Europe Standard Time
(GMT+02:00) Cairo	Egypt Standard Time
(GMT+02:00) Helsinki, Kiev, Riga, Sofia…	FLE Standard Time
(GMT+02:00) Athens, Istanbul, Minsk	GTB Standard Time
(GMT+02:00) Jerusalem	Israel Standard Time
(GMT+02:00) Harare, Pretoria	South Africa Standard Time

(GMT+03:00) Moscow, St. Petersburg…	Russian Standard Time
(GMT+03:00) Kuwait, Riyadh	Arab Standard Time
(GMT+03:00) Nairobi	E. Africa Standard Time
(GMT+03:00) Baghdad	Arabic Standard Time
(GMT+03:30) Tehran	Iran Standard Time
(GMT+04:00) Abu Dhabi, Muscat	Arabian Standard Time
(GMT+04:00) Baku, Tbilisi, Yerevan	Caucasus Standard Time
(GMT+04:30) Kabul	Transitional Islamic State of Afghanistan Standard Time
(GMT+05:00) Ekaterinburg	Ekaterinburg Standard Time
(GMT+05:00) Islamabad, Karachi, Tashkent	West Asia Standard Time
(GMT+05:30) Chennai, Kolkata, Mumbai	India Standard Time
(GMT+05:45) Kathmandu	Nepal Standard Time
(GMT+06:00) Astana, Dhaka	Central Asia Standard Time
(GMT+06:00) Sri Jayawardenepura	Sri Lanka Standard Time
(GMT+06:00) Almaty, Novosibirsk	N. Central Asia Standard Time
(GMT+06:30) Yangon Rangoon	Myanmar Standard Time
(GMT+07:00) Bangkok, Hanoi, Jakarta	S.E. Asia Standard Time
(GMT+07:00) Krasnoyarsk	North Asia Standard Time
(GMT+08:00) Beijing, Chongqing, Hong Kong	China Standard Time
(GMT+08:00) Kuala Lumpur, Singapore	Singapore Standard Time
(GMT+08:00) Taipei	Taipei Standard Time
(GMT+08:00) Perth	W. Australia Standard Time
(GMT+08:00) Irkutsk, Ulaanbaatar	North Asia East Standard Time
(GMT+09:00) Seoul	Korea Standard Time
(GMT+09:00) Osaka, Sapporo, Tokyo	Tokyo Standard Time
(GMT+09:00) Yakutsk	Yakutsk Standard Time
(GMT+09:30) Darwin	A.U.S. Central Standard Time
(GMT+09:30) Adelaide	Cen. Australia Standard Time
(GMT+10:00) Canberra, Melbourne, Sydney	A.U.S. Eastern Standard Time
(GMT+10:00) Brisbane	E. Australia Standard Time
(GMT+10:00) Hobart	Tasmania Standard Time
(GMT+10:00) Vladivostok	Vladivostok Standard Time
(GMT+10:00) Guam, Port Moresby	West Pacific Standard Time
(GMT+11:00) Magadan, New Caledonia	Central Pacific Standard Time
(GMT+12:00) Fiji Islands, Kamchatka	Fiji Islands Standard Time
(GMT+12:00) Auckland, Wellington	New Zealand Standard Time

(GMT+13:00) Nuku'alofa	Tonga Standard Time

Note: this list can be found on the MSDN Microsoft site:
http://msdn.microsoft.com/en-us/library/ms912391%28v=winembedded.11%29.aspx

A.8.5 – Displaying Text Session in Graphics Mode

Previously Axel used the legacy method to display text sessions (telnet, 5250, 3270...) based on columns and rows (80x25, 132x25...) and a specific resolution.

We are changing the way we display text because:

- Many new TFT monitors no longer support the specific resolution required (720x400) - or if they do the characters are blurry and jittery
- Many monitors have a slight delay when changing session of different resolutions. Using graphics resolutions lets Windows and telnet sessions use the same resolution.
- Most new monitors are widescreen, and the legacy characters, designed for aspect ratio 4/3 can be distorted when ‘stretched’ on a wide screen monitor.

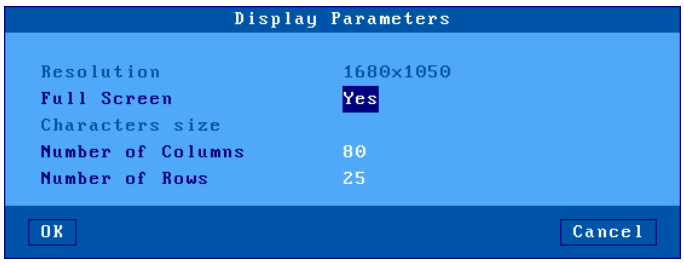
The solution is to use graphics resolutions for text displays. This addresses the first two points above; the character issue is covered below.

The challenge is fitting characters designed for aspect ratio of 4/3 onto a 16/9 screen without creating distortion and keeping the characters ascetically acceptable.

To resolve this issue we offer two variables:

- Full screen or part screen (window).
- Options for character size and space between characters.

Below is the dialogue box showing the options – also see chapters 6.1.3, 7.1.2 and 8.1.4:



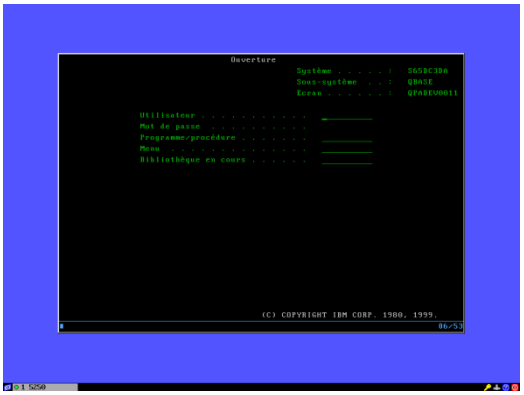
***a)* Full Screen Mode**

To provide similar appearance to legacy screens a full screen mode is offered: the session is displayed on the entire screen and the character size is automatically adapted to the resolution and the number of lines/columns.

When the full screen mode is not selected the terminal calculates the optimal spacing between characters and a window is displayed:

- The background color is selected through the menu [Configuration]-[Terminal]-[Local Desktop]. (See Chapter 3.2.3)
- A grey-light frame surrounds the session.
- And the character size can be customized. (See next sub-section)

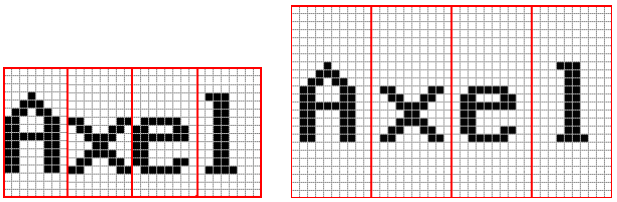
Example:



b) Size and spacing of characters

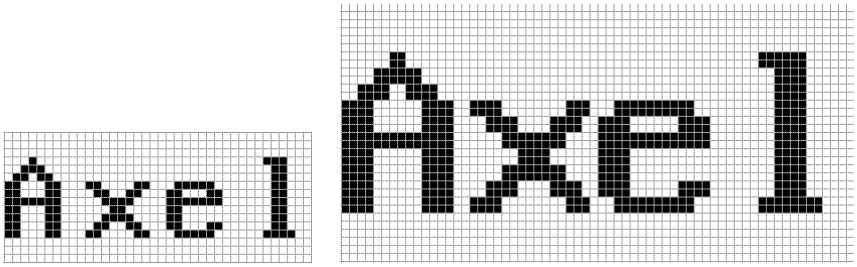
The terminal has a single font (size 8x16 pixels), but two options:

- **Inserting spaces around character** (horizontal and vertical) to 'pad' the character



8x16 (small) 10x24 (standard)

- **Doubling the size of the character** – each pixel mapped to 4 pixels

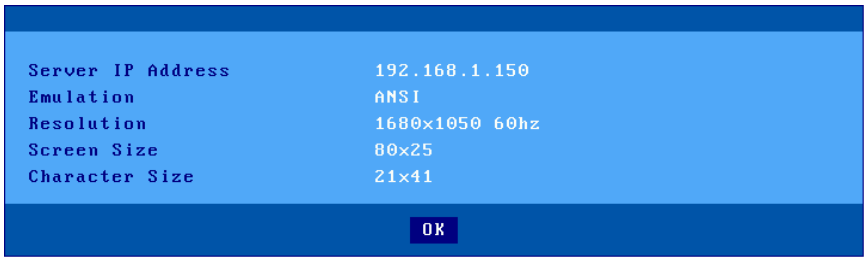


standard size double size

c) Information about Current Session

The <Ctrl><Alt><I> keystroke allows an information box to be displayed.

For example:



A.8.6 - Setting the IP Address by a PING Command

A new feature with version ‘e’ firmware enables the system manager to remotely assign an initial IP address to a brand new terminal, or remotely change an existing IP address.

The procedure is to manually modify the ARP table of your computer (Unix, Linux, Windows...). An ARP table entry is composed of IP addresses and Ethernet MAC addresses. The command below associates an arbitrary IP address to the terminal’s hard coded MAC address. The MAC address is printed on the base of each terminal. With its updated ARP table your computer is able to access the AX3000.To set the new IP address the terminal must be pinged a multiple times.

Using under Unix/Linux:

Run the following command to associate the AX3000’s Ethernet address xx:xx:xx:xx:xx:xx with the IP address a.b.c.d (this command updates the ARP table):

```
# arp -s a.b.c.d xx:xx:xx:xx:xx:xx
```

Run a ping command:

```
$ ping a.b.c.d
```

The first ping requests are not acknowledged. But after few seconds the AX3000 is rebooted and replies the ping requests. The AX3000 is now set with

the a.b.c.d IP address.

Using under Windows:

☺: Windows administration s/w (AxRM or Axel Remote Management) is available free on the Axel Web site. See Chapter 10.1.

The procedure is the same as Unix/Linux except for the Ethernet address notation ('-' are used as separators instead of ':'). The command is:

```
C:\> arp -s a.b.c.d xx-xx-xx-xx-xx-xx
```

Run one or more ping commands (4 ping requests are sent by ping command):

```
C:\> ping a.b.c.d
```

Note: if required this function can be disabled by setting the '**IP Addr. Set by Ping**' parameter to '**no**'. For more information, refer to Appendix A.8.2.

A.9 - HARDWARE AND FIRMWARE INFORMATION

To obtain the terminal's firmware and hardware revisions, use one of the following:

1. Use the AxRM utility - "Get Terminal Information" command,
2. Enter the AX3000 **interactive set-up**, and select [?]-[Information],
3. Get the AX3000 set-up by issuing the **setup_get** remote command (the revision is included in the text file banner):
   Example: rsh axname setup_get > file
4. Use the following **ax_version** remote command to get the revision directly:
   Example: rsh axname ax_version

A.9.1 - Hardware Information

The AX3000 hardware information is **FKx-BVyyy**:

- **FKx** is the circuit board code (FK stands for Flash Key)

- **BVyyy** is the boot code version (the boot code is the non-erasable part of the flash memory)

There are currently five different generations of hardware in the field:
- FK3, FK5 & FK11: models 55, 55E and 56
- FK7: models 65
- FK13: models 65 and 65E
- FK14: models 65/65E (PS/2 mouse)
- FK15: models 60/60E
- FK16: 75/75B/75E
- FK17: models 65B (10/100BaseT)
- FK18, FK19 & FK40: models 75C
- FK20 & FK45: models 65C
- FK30 & FK31: models 70W
- FK35 & FK36: models 70F
- FK41: models 75D
- FK51: models 85
- FK52: models 85B
- FK55: models 80F
- FK56: models 80G
- FK57: models 80WMS

Note: the correct firmware file must be downloaded for your AX3000 hardware. Example: if FK14 firmware file is downloaded into FK11 hardware, the download process will fail.

A.9.2 - Firmware Information

The firmware version is **FCT.NA.yywwi:STD**
- **FCT** is the AX3000 operating mode (TCP or WFI)
- **NA** is the firmware nationality (code is ISO compliant). The main nationalities are:
  - XX: International (except for the following countries)
  - BR: Brazil
  - CZ: Czechoslovakia
  - DK: Denmark
  - EE: Estonia
  - FI: Finland
  - FR: France

- GR: Greece
- IS: Iceland
- PL: Poland
- PT: Portugal
- RU: Russia
- SI: Slovenia
- SK: Slovakia
- TR: Turkey

- **yywwi** is the year and the week number of the firmware creation following by an alphabetical index (for instance: 1236b).
- **STD** stands for 'Standard'. In event of firmware option additional codes follow: **HID** (FootControl), **SMK** (SpeechMike)....

Note: three parameters depend on the firmware nationality:

- The set-up message nationality (FR: French messages, other: English messages),
- The possible presence of a national keyboard and associated character set. For instance, the Turkish environment (keyboards and character set) is only available with the 'TR' firmware.
- The default keyboard nationality (FR: France, XX: North American, TR: Turkey, etc).

PERSONAL NOTES

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